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Electronic Devices in Telephony

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SECOND OF A SERIES of articles on electronics and electronic devices used in telephone work. First article, published February 11, set forth the basic principles underlying vacuum tubes. This article discusses the application of these principles to thermionic diodes and triodes

THE BASIC electronic principles underlying vacuum tubes were presented in the preceding article of this series. In this article, the application of these principles to diodes and triodes will be considered. The discussion will be limited to thermionic diodes and triodes; that is, to tubes in which the electrons are given off by thermal emission from heated filaments.

The *diode* is a two-electrode tube consisting of a filament and a plate in an evacuated enclosure. The *gas* diode contains a small amount of a stable (inert) gas. In addition to a filament and a plate, the *triode* has a control electrode or *grid* inserted between the filament and plate. It is this grid which makes possible the use of the triode as an amplifier of the attenuated speech signals. Such tubes are highly evacuated and all traces of gas are removed insofar as practicable. Certain special types of triodes contain a small amount of gas but at present these are of little importance in telephony.

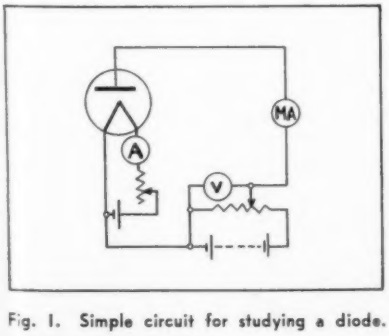


Fig. 1. Simple circuit for studying a diode.

Characteristics of High-Vacuum Diodes

A simple circuit for determining the characteristics of a diode is shown in Fig. 1. The filament current can be adjusted by the rheostat shown, and the current measured by the ammeter, A. The voltage on the plate is adjusted by the variable voltage divider connected across the plate-circuit battery. This voltage is measured by the voltmeter, V, and the plate current flow is indicated by the milliammeter, MA.

To determine the characteristics, suppose that the plate voltage is held *constant* at some value E_p, that the filament current I_f is *varied* from zero to some value slightly above the normal current, and that the plate current values are plotted as shown in Fig. 2. It will be observed that no current flows to the plate until the filament current reaches a value sufficient to raise the temperature of the filament to a point where electron emission occurs.

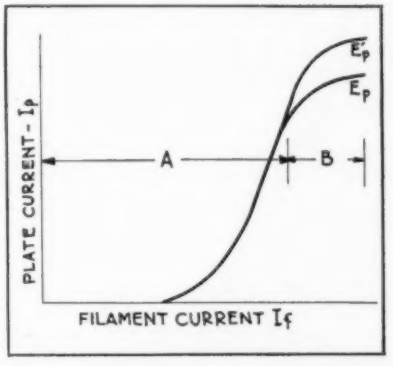


Fig. 2. Characteristics of a high-vacuum diode. In the region A the plate-current flow is limited by the filament temperature and the corresponding emission. Over the region B it is limited by the negative space charge existing between the filament and the plate.

As the filament current is increased, more electrons are thrown off by the filament, and these are attracted to the plate, increasing the plate current. A condition is soon reached, however, where the positive plate takes all the electrons it can for the particular plate voltage E_p. If the plate voltage is increased to a value E_p', more electrons are attracted and a new plate-current curve will result.

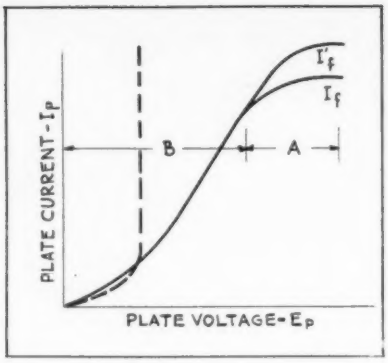


Fig. 3. In the high-vacuum diode, plate current flows for low values of plate voltage if the filament is at normal temperature. Space charge limits the current flow over region B and emission limits the flow over region A.

In the region A, the current to the plate is limited by the value of the filament current and the resulting filament temperature. In the region B, the plate current is limited by the negative space charge. As discussed in the preceding article (TELEPHONY of February 11), this space charge is due to the presence of a cloud of negative electrons near the filament from which they were just emitted. They repel other electrons attempting to flow to the plate and thus limit the plate current.

To study further the characteristics of the diode, suppose that the filament current I_f, and thus the temperature, is held *constant* at the normal operating value, and that the plate voltage E_p is *varied*. If readings of the resulting plate current are plotted, the curve of Fig. 3 will result.

Since plenty of electrons are available at all times, the plate current starts flowing immediately. In fact, it will even flow with no plate voltage applied, or with the plate slightly negative. This is because certain of the high-speed electrons thrown off by the filament have sufficient energy to carry them across the space charge and on around the plate circuit.

A point is soon reached, however, where the electrons are taken by the plate as fast as they are emitted. Thus over region A the plate current is limited by the temperature and hence the emission of the filament. Over the region B, it is limited by the space charge. If the filament current is increased to I_f', more electrons are available and a new value of plate current results.

A circuit such as Fig. 1 can be used to determine the characteristics of a gas diode. The plate voltage required will be less than for a comparable high-vacuum tube because, as was shown in the preceding article of this series, the gas reduces the internal drop in the tube and hence the voltage required to pull a given electron current to the plate is smaller.

In working with gas diodes, care should be taken that the plate current, and thus the internal voltage drop between the plate and filament, do not exceed the rated values. If they do, the massive positive ions which were produced by ionization by collision (see previous article) will be accelerated to a critical value. Above this point, these positive ions will have energies sufficient to damage the negative filament when they are drawn to it and impinge on it.

Attention is called to the fact that it is customary to speak of the anode and cathode instead of plate and filament when dealing with *gas* tubes. This particularly applies to power applications, but no useful purpose will be achieved by using this dual wording in these articles.

Before a gas tube has a voltage impressed on its plate, the filament should be allowed to reach full operating temperature. Although this is not so important in small tubes, it is of great importance in the larger sizes. If these precautions are not followed, the plate current will be small and the resulting positive ions will be few. The plate voltage will, accordingly, be high because there is little drop in the external circuit; and the high speed reached by the positive ions, due to this large voltage, may be sufficient to cause these ions to damage the filament.

If the filament is held at the correct value, and then the plate voltage is varied, results such as the dotted curve of Fig. 3 are obtained. This curve indicates that an arc will be established and the tube ruined if the plate voltage were further increased. This curve is also shown in approximate form in Fig. 4. As this curve plainly indicates, the voltage drop across the gas diode is substantially constant and independent of the value of current. Increasing the current causes more ionization by collision, more positive ions, and a further reduction of space charge.

The two-electrode tubes or diodes just discussed are largely used as retifiers. The circuits and other details will be treated in a later article of this series. It is the three-electrode, high-vacuum tube or *triode* which has made possible so many of the important developments in telephony.

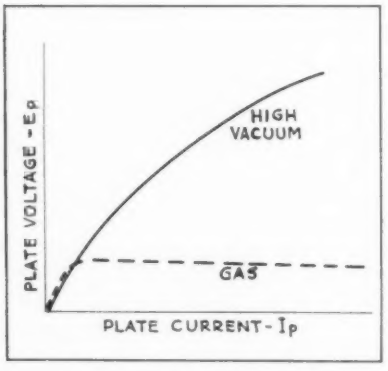


Fig. 4. These curves show the functioning of diodes as circuit elements. The voltage drop across the gas diode is low and is substantially independent of the current flow over a wide range, but for the high-vacuum diode the voltage drop is higher and increases with the current.

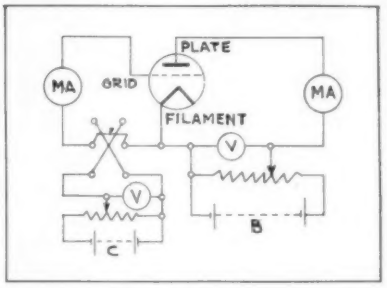


Fig. 5. Simplified circuit for studying a triode. The filament control circuit is omitted.

In the three-electrode tube or triode, a grid is inserted between the filament and plate. This grid is usually a mesh or spiral of wire, and the electrons from the filament must pass through the grid to reach the plate. Furthermore, the grid is near the space-charge region where the electrons have low velocities. It is apparent that the grid can exert a controlling influence on the current to the plate.

If the grid is made *negative*, it lowers the flow of electrons from this space-charge region to the plate. If it is made *positive*, it assists the plate in drawing electrons from the space-charge region. For reasons which will appear later, the grid is usually operated at a negative potential with respect to the filament. If it is made *more* negative, *less* current will flow. If it is made *less* negative, *more* current will flow.

A simple circuit for studying a

triode is shown in Fig. 5. The A battery and the filament-current control circuit are omitted in accordance with custom, it being assumed that the filament is at operating temperature. For a given negative voltage on the grid, curves such as shown for the diode would be obtained by varying the filament current and plate voltage. Hence, this part need not be repeated, for the present at least.

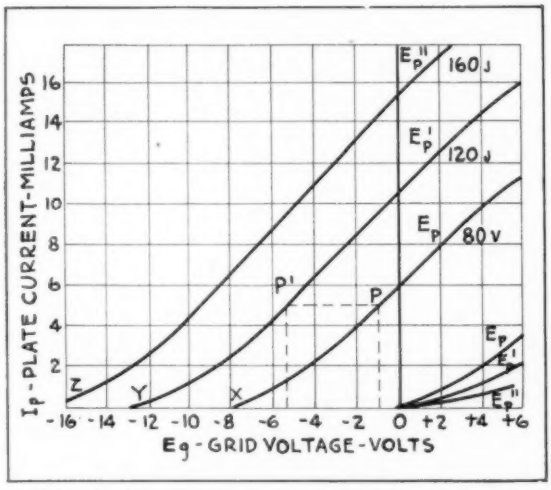
The curves for a triode of particular importance are those obtained by holding the filament current and the plate voltage at normal values, and then varying the grid voltage. This voltage can be made either postive or negative by throwing the reversing switch of Fig. 5.

The characteristics of a triode can be expressed by three constants, and these are not only useful for descriptive purposes but in design work as well. In reality, these are not exactly constants because they vary somewhat; the term coefficients is sometimes used instead.

The first of these terms is the amplification factor, and can be explained by referring to Fig. 6. Owing to its strategic position the grid, through which the electrons must pass, can effectively control this plate current. Thus, even with a plate voltage of say, $E_p = +80$ volts, a grid voltage of $E_c = -8$ volts will reduce the plate current substantially to zero. Similarly, for a plate voltage of $E_p' = +120$ volts, a grid voltage is $\mu = 40/4.5 = 8.9$. The Greek letter μ (mu) is used to designate the amplification factor.

The plate resistance is the next important factor which will be discussed. As will be pointed out in a later article, the vacuum tube operating as an amplifier really acts like an alternating-current generator with a given voltage output and a given internal resistance. It is this *alternating current* internal resistance which is designated as the *plate resistance*. Note in particular that it is *not* the direct current resistance (such as would be obtained by dividing plate voltage by plate current) which is desired.

To explain fully the meaning of the plate resistance, the additional



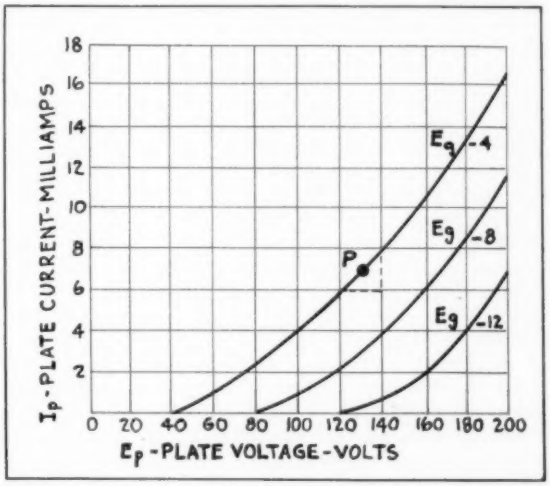


Fig. 6 (above). Characteristics of a triode at three different operating voltages — E_p, E'_p and E''_p. The grid current curves in the lower right-hand corner would be plotted to a different scale than the larger plate-current values. Fig. 7 (to the right). Characteristics of the triode of Fig. 6 at various grid voltages.

The results of such a test are shown in Fig. 6.

The first curve is taken with normal filament current and a rather low plate voltage, $E_p = 80$ volts. As long as the grid is quite negative, no current flows to it; but when it is *slightly* negative or positive, it collects a current. If the grid is sufficiently negative, as indicated by point X, the plate current is reduced to zero, and the current flow within the tube is blocked.

If the plate is made more positive, such as E_p' and E_p'', then a greater plate current flows, and greater negative grid voltages Y and Z are required to stop the current flow and cause cutoff. Note that for these greater plate voltages and plate currents the positive grid current becomes less. This is because the greater plate voltage takes a larger percentage of the total current which flows from the space-charge region.

$E_y = -12$ volts will reduce the plate current about to zero.

Thus, the grid is 120/12 or 10 times as effective as the plate. As an amplifier, the tube is not usually operated over the entire curve, but the computations just made included the lower curved portion as well as the straight portion which is used in amplification.

To be more correct, therefore, the amplification factor is determined as follows: By definition the amplification factor is a measure of the relative effectiveness of the grid and plate voltages in controlling the plate current *over the operating region.*

Thus, in Fig. 6 if the plate voltage is increased from P to P'—that is, 40 volts—and at the same time the grid is made more negative from —1 to —5.5 volts, the plate current will remain constant. Then, the amplification factor *over the region of operation as an amplifier*—that is, the straight portion of the curve—

set of curves of Fig. 7 is necessary. These are obtained with the circuit of Fig. 5 in the following manner: The filament current is held constnat at the normal value. The grid voltage is set at the values indicated on the curves, and the plate current flowing for various plate voltages is observed and plotted.

These curves show the relation between plate voltage and plate current at various grid voltages. Now plate voltage divided by plate current gives a resistance value, but note that this value differs for each point of operation; that is, at each different plate-voltage value. What is desired is the plate resistance at a point of operation such as P.

Then, the plate resistance becomes the reciprocal of the slope of the curve at this point. At point P this slope is approximately equal to $r_p = 20/0.002 = 10{,}000$. The curves of Fig. 7 also illustrate the theory of

the grid as previously considered. As the grid voltage is made more negative, greater values of plate voltage are required to cause the plate current to flow.

The third vacuum-tube coefficient is called the mutual conductance, and is useful in certain types of work. Numerically, the mutual conductance is equal to $g_m = \mu / r_p$, and is usually measured in micromhos. Since it can be expressed in terms of the amplification factor and the plate resistance, no further treatment is required.

Types of Filaments

Three types of filaments are commonly used in vacuum tubes: The pure tungsten filament, the thoriated-tungsten filament and the oxide-coated filament. Of these, only the latter type is of primary importance in telephony.

The oxide-coated filament is the most efficient, practicable electron emitter of the three, and is well suited for telephone uses. A layer of suitable oxides is coated and formed on the surface of a central wire ribbon. This oxide layer emits electrons quite readily when heated by passing the filament current through the central core.

In the triode, filaments are ordinarily used, but in screen-grid tetrodes and pentodes, the separate-heater type of emitter or cathode is employed. These need not be considered at this time.

Summary

The diode is the simplest thermionic vacuum tube, and consists of a plate and a filament in an evacuated enclosure. In some diodes, a small amount of an inert gas is admitted to reduce the space-charge effect. This is done by the massive positive ions which are produced by ionization by collision. Diodes are largely used as rectifiers.

In the triode, a third electrode called a grid is placed between the filament and the plate. The electrons constituting the current flowing to the plate must pass through the grid which can, therefore, readily control their flow. It is this characteristic which gives the triode its many important applications.

The characteristics of a triode may be expressed in terms of three constants, or more correctly, coefficients. These are the amplification factor, the plate resistance, and the mutual conductance. Since this last term can be expressed in terms of the other two, it is usually relatively unimportant.

In the next article of this series, multi-electrode tubes, the tetrodes and pentodes, will be treated.

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AN OPEN LETTER

February 27, 1939.

My dear Congressman X:

Uncle Sam pays you a salary of $10,000 a year. Besides that you get traveling expenses and allowances for clerical help, free office space, use of the mails, and other privileges. I am not kicking about this, Mr. Congressman. I'm sure you are worth it and more to your country. I am just calling your attention to this so that you can understand MY business problem.

Suppose that all you received from the government was $10,000 a year. Suppose on top of that, the Federal government made you hire enough stenographers to keep at least one on duty all the time—night and day—at increasing wages and decreasing hour standards that would eventually figure out at 40 cents an hour and 40 hours a week. Suppose the government made you do all this, Mr. Congressman, OUT OF YOUR OWN $10,000 A YEAR.

You are saying to yourself that you would lose money—that you couldn't do it. You're right, Mr. Congressman! Your stenographic bill alone would come to $3,504. That would leave you $6,496 to pay your other office expenses, to go to and from Washington and to live there several months every year, besides supporting your establishment back home, and paying taxes. You can easily see that if you received LESS than $10,000 a year from the government, you would be in the red before you started out to Washington for your first session.

Well, that's just the spot the small Independent telephone industry is in—if the Fair Minimum Labor Standards Act of 1938 is generally applied to it. According to the 1932 Census (the latest available), there were 6,504 central telephone offices operating in the United States with an annual income of less than $10,000. Most of them were operating at much less than $10,000. And, according to a recent study, by the United States Independent Telephone Association, of nearly a thousand typical rural exchanges operating up to 250 telephones each, these exchanges—now rendering satisfactory public service at a very modest profit—would be hopelessly in the red if only the first step were taken in the application of the wage-hour standards for the year 1939.

I won't bother you with more statistics, Mr. Congressman. There will be plenty of them available when the Herring-Harrington bill comes up for your consideration. I merely write to ask that you be sport enough to look into the situation. I am sure that if you do, your own sense of fairness will make you actively support this legislation. The need is pressing. Thousands of small telephone exchanges throughout the country are faced with the alternative of either curtailing an essential public service to our rural communities or abandoning service, with a resulting increase rather than decrease of unemployment.

The telephone business is not like any other business which can raise its prices to offset added expense. Its rates are fixed by law as well as restricted by economic demand. It is not only on the spot itself, but its many satisfied subscribers and employes are on the spot also. You can earn their lasting gratitude by simply interesting yourself in the Herring-Harrington bills (S. 1234 and H. R. 3842), now before the House and Senate labor committees, respectively.

Very truly yours,

A TELEPHONE MAN.

Flashes and Plugs—News Briefs and Comments

In her pre-Christmas radio talk, Mrs. Eleanor Roosevelt paid a glowing tribute to the telephone as a means of transmitting personal greetings to friends and relatives.

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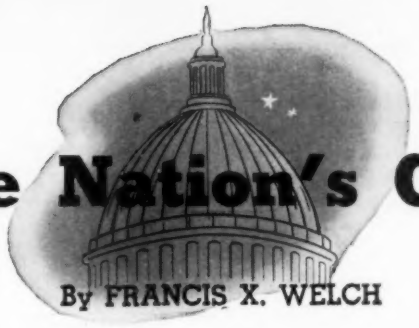
The January blizzard in Chicago compelled the Illinois Bell to put on 1,000 extra telephone operators. More than 5,000,000 calls were handled that day—a million more than normal.



In the Nation's Capital

By FRANCIS X. WELCH

Special Washington, D. C., Correspondent for TELEPHONY

ANALYSIS OF BILLS for reorganizing the FCC indicate no legislation will be proposed during this session of Congress. Senator White in attack on the Wheeler bill declares it makes contribution only to political efficiency of the commission. Comments on Senator White's FCC bill relate to its two-division feature. Activities on Wage-Hour amendment

IF THERE were much doubt about the likelihood that the New Deal will fail in its effort to obtain FCC ripper legislation at the current session of the Congress, that doubt was largely eliminated by the introduction last week of a bill by Maine's Senator White to set up an eleven-man commission. To be bluntly frank, your correspondent is of the opinion that Senator White himself has not the slightest idea that his eleven-man FCC bill (S-1520) will ever be enacted by this Congress.

His bill represents an adroit parliamentary maneuver to administer the final knockout blow against the Administration's ripper bill, introduced by Senator Wheeler three weeks ago. The Wheeler bill, you will recall, would set up a three-man commission, with the chairman in the driver's seat, and the two "other commissioners" in the rumble seat.

The White bill by its very provision for an enlarged commission membership, bi-partisan control, and a restricted chairman, spotlights the emphasis on the most vulnerable feature of the Wheeler bill. This weakness, of course, is the contraction of the commission membership, with the resulting surrender of administration control to a chairman who will be dominated by the administration. Coming at the same time when Congress is considering another reorganization bill (said to have administration support) to enlarge the membership of the ICC, Senator Wheeler's bill is put right on the spot. All of which is just what the canny Maine Senator intended.

The White bill, then, will function as a sort of counter-irritant for the Wheeler bill and is not to be taken very seriously on its own account. Result: Stalemate and no FCC ripper legislation this session.

Already Senator Wheeler is getting wobbly over his own bill and is on the verge of abandoning it to its fate. Your correspondent reached this conclusion when he learned that Senator Wheeler had decided to have the Senate interstate commerce committee (of which he is chairman) take up hearings on the railroad legislation before his own FCC reorganization bill.

That probably means no Senate hearings on the Wheeler bill in March, as originally planned. The railroad hearings will occupy the committee most of March and possibly some of April. And when a controversial bill has to wait until April before it even gets to committee hearings, it's generally a pretty dead chicken for the rest of the session, unless Congress decides to stay in Washington for the summer.

What may happen is that when (and if) the Senate committee opens hearings on the Wheeler bill sometime in April, the White bill will be taken up at the same time. The FCC may have a "study report" on hand to try to blow the White bill to pieces. In turn, the FCC will find the apple on its own head. Out of it may come a recess investigation of that whole mess.

That's just a long shot appraisal at this writing, but your correspondent thinks that there is a fair chance that things will turn out just about like that. Chairman Lea of the House interstate commerce committee introduced a duplicate of the Wheeler bill in the lower house, but that is simply routine. The House committee is not likely to budge on this matter until it sees what happens in the Senate.

BEFORE going into the provisions of Senator White's bill, TELEPHONY'S readers will be interested in the bitter attack made on the Wheeler bill by the Maine Senator in a statement inserted in the Congressional Record of February 17. Senator White summed up the Wheeler bill just about the same as your correspondent did in this department two weeks ago. In the Senator's opinion the Wheeler bill is an attempt to subordinate the administrative control of all Federal regulation of communications in one man appointed by the President as the chairman of the proposed three-man commission.

Senator White recalled President Roosevelt's letter of January 23 (1939) to the chairman of the two congressional committees on interstate commerce, in which he expressed dissatisfaction with the "present legal framework and administrative machinery of the commission." He recalled that while the President did not suggest specific legislation for reorganization, the bill subsequently introduced by Senator Wheeler was presumably the Administration's bill because of the collaboration of Chairman McNinch. He added:

"Now, it should be noted first that the present legal framework and ad-

ministrative machinery of the commission with which the President expresses dissatisfaction is in no small part the handiwork of Chairman McNinch; and next, that in the 20 months or thereabouts since Mr. McNinch was confirmed as chairman there have come from the commission no recommendations as to policies on the substantive side. On the contrary, efforts to undertake a congressional study of principles and of policies by the Congress have been blocked by commission and executive hostility.

I presume to assert that these recommendations of Mr. McNinch do not reflect the considered judgment of any person informed as to our communication problems and do not make contribution to the communication services of our country.

This McNinch bill discloses two major purposes. It first provides for a three-man commission. This proposal challenges every previous declaration of the Congress on this subject, and it repudiates the heretofore expressed opinions of Mr. McNinch himself."

Senator White went on to recall that the Radio Act of 1927 created a commission of five members—a number then deemed sufficient by Congress to deal with the problems of radio alone. When the Communications Act of 1934 was enacted, the Senate still favored five members and the lower house then amended the Senate bill by increasing the membership to seven. This amendment was made under the sponsorship of Representative Rayburn of Texas, who is now the majority leader of the lower house. The House bill finally prevailed. As a result we have the present FCC of seven members.

Senator White then observed that the "pending McNinch bill now asserts both houses of Congress to have been wrong in their judgments," and proposes to reduce the the number from seven to three, although neither the commission as a whole nor any of the communications industries affected nor other qualified interested parties have ever recommended such a reversal of policy.

Senator White went on:

"It is significant that at the very time Chairman McNinch would have the Congress accept his judgment that three men will better understand and more efficiently administer the work of the commission than seven commissioners, he is urging upon the appropriations committee of the House as a vital necessity an increase of 63 in the other personnel of the commission.

He would have us believe that, while the increased work of the commission demands increased personnel in all other directions, the membership of the commission should be reduced from seven to three. It is important to recall, too, that in October, 1937, in referring to the abolishment of the three divisions of the commission theretofore set up, Mr. McNinch said 'the aggregate wisdom and judgment of seven minds is surely greater than any two or three of the seven.'

But Mr. McNinch now urges that the burden of knowledge and of decision in the entire field of communications shall be placed upon three commissioners. I appeal from Mr. McNinch of 1939 to Mr. McNinch of 1937. I am strongly opposed to a three-man commission. An increase in the commission's present numbers is to be preferred to a reduction."

Taking up the matter of three administrative systems, as provided by the Wheeler bill, Senator White remarked that the FCC has complete authority under the Communications Act, as it is written now, to set up such internal organization if it so desires, and that no new legislation is necessary to this end. He was referring to the provision of the 1934 Act which authorizes the FCC to establish divisions, fix their functions, and appoint directors of each.

Senator White recalled that when Mr. McNinch became FCC chairman, one of the first things he did was to abolish the old three-division system on the theory that the seven members of the FCC should not be divided that way. He quoted Chairman McNinch's explanation at that time about the impropriety of the chairman carrying an "unnecessary load of responsibility and exercising an undesirably large portion of the powers and functions of the commission."

In short, Senator White took the view that Mr. McNinch, having abolished the three divisions, now proposes to recreate them under different labels and in such a form as to place more control than ever in the chairman and take it away proportionately from the commission as a whole. Senator White concluded:

"Must we now understand that whatever seven minds might have had of knowledge in 1937, in this good year of 1939 the aggregate wisdom and judgment of three men is greater than that of the seven? The plain truth of the matter is that the aggregate wisdom and judgment of seven men is not now wanted. Mr. McNinch, in the name of cooperation, demands the yielding to his direction of the experience, knowledge, judgment, and conscience of the other commissioners. And it is because some commissioners will not thus unconditionally surrender that they are to be legislated out of office. A legislative purge of commissioners of independence and courage is now demanded.

Stripped of all pretense, this bill, in disregard of all previous congressional purpose and drafted without present congressional study, proposes, through his statutory administrative control of the division assistants and through his influence as chairman, to vest in one man authority over the vast communication interests of this country and in particular a life-and-death power over broadcasting, one of the two means of reaching the mind and influencing the thought of America.

The bill makes contribution only to the political efficiency of the commission. It does this through the centralized power hereinbefore referred to, and through the provision transferring all officers and employes of the present commission — other than the members thereof whose offices are abolished—from their present protected civil-service status to a temporary status.

It serves no good end whatsoever. The bill is crude in draft, wrong in principle, political in purpose, and carries in its terms and implications a sinister threat to all our communication facilities and to the country itself."

TAKING UP now Senator White's own bill, the telephone industry will be particularly interested in the two-division feature contained therein. As stated before, Senator White himself probably nourishes no hope that this bill will become a law. But it may be that when the Congress does get around to enacting new legislation for the FCC (which now looks like it might happen some time in 1940), it will re-

(Please turn to page 37)

Best Story of the Week —*What's Yours?*

A newspaper man in Washington, D. C., named Lee Miller, recently wrote to the Chesapeake & Potomac Telephone Co. asking that his house telephone number be changed to MI-5537, explaining that such a combination on the dial would spell out his name.

Interested, the telephone company called up, said sure, they'd fix it up for him, but asked whatever in the world made him think of the idea. Mrs. Miller points out that while telephone numbers are hard to remember, any one can remember the name of the person he's calling.

Some Results of Wage-Hour Uncertainties

FOR SOME weeks we have been asserting in these columns that, unless it is made certain by definite wording that the national Wage-Hour law (the correct name is "Fair Labor Standards Act of 1938") does not apply to small Independent telephone exchanges, there will necessarily be a curtailment generally of the service of these exchanges, and many of them will have to close entirely.

The United States Independent Telephone Association —through its wage-hour committee, assisted by officers and other members of the organization—has for more than a month been active in Washington, endeavoring to obtain, in some manner, relief for small Independent exchanges from the requirements of the federal Wage-Hour law. It is clear that it is utterly impossible for thousands of small Independent exchanges to meet the requirements of the Act.

THE ASSOCIATION first hoped to obtain some species of relief for these small exchanges through interpretations of the law by the Wage-Hour Administrator. The law itself exempts "service establishments" from its provisions relative to wages and hours. The Administrator, however, decreed in December that telephone exchanges are not "service establishments" under the Act and, therefore, are not exempt as such.

After this interpretation by the Administrator, the association went to work to obtain an amendment to the law which would specifically exempt small telephone exchanges. As the result of conferences with the Administrator, and with a number of Senators and Representatives in Congress, the association advised all Independent telephone companies to support bills to amend the Act, introduced in both the Senate and the House of Representatives, about the middle of February.

One of these bills, introduced by Senator Clyde M. Herring of Iowa, would amend the Act so as to exempt the operators of telephone exchanges of 1,000 subscribers or less. This is Senate Bill 1234. An identical bill, (H.R. 3842) was introduced in the House of Representatives by Representative Vincent F. Harrington, also of Iowa. The association is supporting both of these bills. It is now expected that the Senate bill will come up for hearing before the Senate committee on education and labor about March 23; the House bill, it is expected, will be heard by the House labor committee soon thereafter.

THIS IS the legislative situation as it now stands. Meanwhile, however, some Independent telephone companies are finding that they cannot await the relatively slow process of national legislation. They realize that under the law, as it now stands, contingent liabilities are building up against them, and if the law is not amended in a manner that does protect Independent exchanges, these liabilities may bankrupt them.

In the state of Georgia, the Ellijay Telephone Co., on January 20, notified all its subscribers that it was curtailing its service to eight hours daily and that, even to keep to this schedule, it would have to increase its present rates. Subscribers were also told that to furnish 24-hour service, rates on all telephones would have to be increased at least $2.50 per month.

This company has filed a petition with Georgia Public Service Commission, asking permission to raise all rates and to limit service to eight hours daily.

In North Carolina, the Cliffside Telephone Co., operating at Avondale, has requested the sanction of the North Carolina Utilities Commission for the abandonment of the exchange.

The Seattle Telephone Co., also in North Carolina—operating an exchange in the town of Altamahaw—has served notice on its subscribers and the commission that at midnight, March 18, operating will cease.

There are other cases throughout the country, similar in character; but because the specific facts concerning them are not at the moment available, we refrain from attempting to describe them. The cases outlined are, however, sufficient to illustrate the condition that prevails in many parts of the country.

This is an almost inconceivable situation. It is difficult to believe that the Congress of the United States would have intentionally or deliberately created a condition that would compel many small telephone exchanges to quit business, thereby depriving the citizens of many small towns—and thousands of farmers—of a service that is well nigh indispensable to them.

THE ONLY answer seems to be that Congress, in enacting this law, did not take into account what would be the situation of the small Independent telephone exchanges under it. The only remedy seems to lie in an amendment to the law. This amendment, to be of any use to the small companies, must be enacted during this present session of Congress.

As the situation stands, unless the law is amended at this session of Congress so as to afford real relief to these small Independent exchanges, telephone service in many small towns in the United States—and service now being supplied to some hundreds of thousands of farms in the United States—must necessarily be curtailed so drastically that it will be hardly the equal of telephone service that was provided in such localities 20 or 30 years ago.

This is certainly progress in the wrong direction. The only possible cure for it, apparently, is to tell your Senators and your Representative in Congress what this situation really is.

Bell Report Shows Industry's Improved Position

RISING COSTS, notably wages and taxes, may require some increases in rates, despite every effort toward efficiency and economy, says President Gifford of American Telephone & Telegraph Co. Striking improvements noted in service. How changes in business conditions affect telephone employment. Of immeasurable influence in human affairs is the far-reaching change in the speed and scope of communications.

ALTHOUGH in 1938 dividends paid by the American Telephone & Telegraph Co. were not earned by $12,638,000, there was a balance in 1937 after dividends of $14,162,000. Thus for the two years of 1938 and 1937 combined, dividends were slightly more than fully earned. In 1938 the Bell System's gross operating revenue was $1,052,658,000, approximately the same as in 1937.

Due principally to increased wages and continued increase in taxes, net operating income was less by $16,483,000, or 8 per cent, according to the company's annual report made public this week. With a decline in earnings of the Western Electric Co., which were adversely affected largely by a falling off in Bell System construction activities for the year, other income was less by $12,794,000.

The total net income for the year applicable to American Telephone & Telegraph Co. stock was $155,543,000, or $8.32 per share. This compares with $9.76 per share in 1937.

Cash assets of the Bell System at the end of the year, including funds temporarily invested in government obligations, were $135,965,000, of which the A. T. & T. Co. held $96,911,000.

During the year, plant additions amounted to $296,800,000 and plant retirements to $197,300,000, resulting in a net increase in plant of $99,500,000, or 2.3 per cent. This compares with a net increase in plant of $130,300,000 in 1937.

Total assets of the Bell System at the end of 1938 amounted to $5,119,100,000. Of these assets, $4,489,100,000 was telephone plant and equipment against which there were depreciation and amortization reserves of $1,253,100,000, or 27.9 per cent. The investment in telephone plant at the end of 1938 was equal to $285 per telephone.

Taxes continued to rise. The total, including taxes charged to construction, amounted to $147,400,000, an increase of $9,700,000 over 1937. Taxes in 1938 were $53,000,000 greater than in 1935. Thus in three years, there was an increase of 56 per cent.

Taxes in 1938 were equal to $7.54 per share of common stock outstanding as against $4.83 per share in 1935, an increase of $2.71 per share. Taxes in 1938 were equal to about 80 cents per month per telephone, or 14 per cent of the average telephone bill, or about one-third of the total payroll.

During 1938, the Bell System had a net gain of about 430,000 telephones compared with 876,000 in 1937. More

	Dec 31, 1920	Dec 31, 1925	Dec 31, 1930	Dec 31, 1935	Dec 31, 1938	Increase* During 1938
Number of telephones†	8,133,759	11,909,578	15,187,296	13,573,025	15,761,095	429,112
Number of central offices	5,767	6,147	6,639	6,896	6,975	30
Miles of pole lines	362,481	394,529	428,212	407,454	399,368	*3,752*
Miles of wire:						
In underground cable	14,207,000	27,769,000	45,116,000	47,639,000	50,783,000	1,256,000
In aerial cable	6,945,000	12,835,000	23,777,000	26,425,000	28,072,000	602,000
Open wire	3,711,000	4,339,000	5,231,000	4,562,000	4,590,000	4,000
Total	24,863,000	44,943,000	74,124,000	78,626,000	83,445,000	1,862,000
Per cent total wire mileage in cable	85.1	90.3	92.9	94.2	94.5	.....
Average daily telephone conversations:‡						
Exchange	31,818,000	48,051,000	61,150,000	58,066,000	67,400,000	1,142,000
Toll and long distance	1,307,000	2,090,000	2,884,000	2,224,000	2,497,000	*35,000*
Total	33,125,000	50,141,000	64,034,000	60,290,000	69,897,000	1,107,000
Total plant	$1,373,802,000	$2,566,809,000	$4,028,836,000	$4,187,790,000	$4,489,078,000	$99,529,000
Number of employes††	228,943	292,902	318,119	241,169	257,443	*11,039*
Number of A. T. & T. Co. stockholders	139,448	362,179	567,694	657,465	646,882	5,196

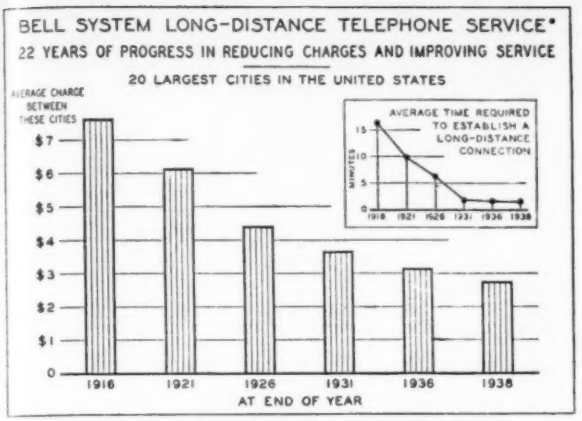
*Decreases shown in italics.

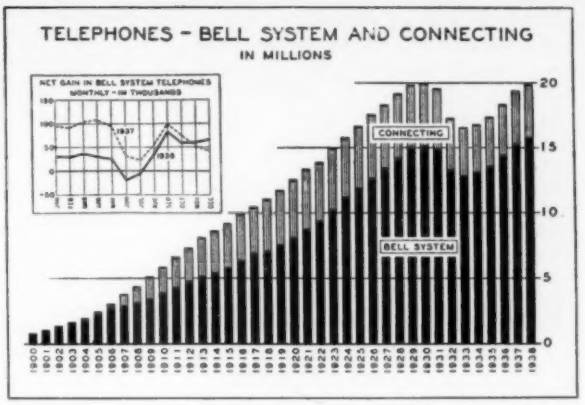
†Excludes private line telephones numbering 79,612 on December 31, 1938. Including telephones of about 6,500 connecting companies and more than 25,000 connecting rural lines, the total number of telephones in the United States which can be interconnected is approximately 19,885,000.

‡For year ending December 31.

††The employes of the Western Electric Co., Inc., and the Bell Telephone Laboratories, Inc., numbering 34,910 on December 31, 1938, are not included.

Comparative Bell System statistics for 1938 and for five-year intervals from 1920 to 1935.





*This chart shows at intervals over a 22-year period the *average* charge, at day rates, for three-minute long distance "station-to-station" calls between the 20 largest cities in the United States. 1916 was the first year in which all the 20 cities were interconnected by telephone. The average air line distance between these cities is 970 miles. The insert shows the *average* number of minutes required to establish a long distance connection in these 20 cities.

than 60 per cent of the gain in 1938 was made in the last four months of the year. At the end of the year the Bell System had 15,761,000 telephones in service.

The average daily number of telephone conversations during the year was 69,900,000, an increase of about 1,100,000 over 1937. While there were about 1.7 per cent more local conversations, there were 1.4 per cent fewer toll and long distance conversations than in the previous year. At the end of the year, however, the daily number of toll and long distance conversations was somewhat higher than at the end of 1937.

Including the telephones of about 6,500 connecting telephone companies and more than 25,000 connecting rural lines, there were at the end of the year approximately 19,900,000 telephones in the United States, practically any one of which can be connected promptly with any other and with 93 per cent of the telephones in the world.

Bell System rate changes in 1938, although they resulted in a net reduction of some $4,500,000 annually, included upward adjustments in some places where revenues were less than adequate.

"Rising costs, notably wages and taxes," states President Walter S. Gifford in the report, "are not only largely arresting the downward trend in telephone rates but may require some increases in rates in other places in spite of every effort to offset higher expenses through developments in the art, improvements in operating methods and rigid economies."

Stating that the prime purpose of the Bell System is to furnish telephone service, the report gives some comparisons of today's service with that of a relatively short time ago to show the striking improvement that has been made.

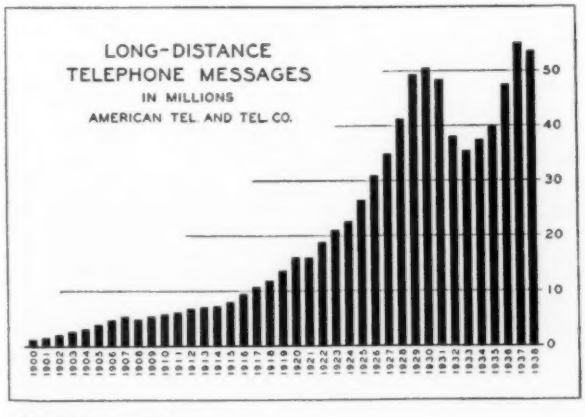
Until 1927, the longest distance a telephone call could be made was about 3,000 miles. Today there is no limit; one can talk around the world. Improvements in the quality of transmission—that is, the clearness and the ability to understand conversation—have been especially marked.

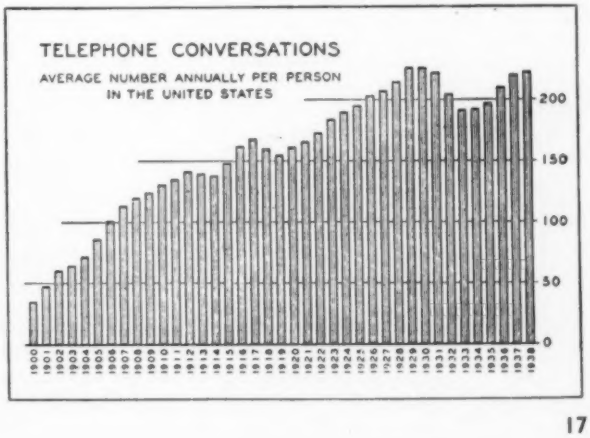
The improvement in transmission on a call from New York to San Francisco as compared with 20 years ago—which was shortly after transcontinental service was inaugurated—is roughly equivalent to the difference between conversing in an open field at a distance of several hundred feet and conversing within the same room. The cost of a three-minute New York to San Francisco call then was $18.50; now it is $6.50, and for nights and Sundays, $4.25.

Ten years ago it took on the average 3.2 days from the time an order for a new telephone was received to have it installed. Today the average time is 1.4 days. Also ten years ago a telephone subscriber had some trouble with his telephone or his telephone line about once in a year and a half on the average. Today he has trouble only once in over two years.

Ten years ago the average time required to make a toll or long distance connection was 3.0 minutes, having been reduced during the preceding five years from 7.5 minutes. Today the average time is 1.4 minutes; and 93 per cent of long distance calls are handled without the person who is calling hanging up the telephone.

"It is necessary that the service be





pleasing as well as efficient," comments President Gifford. "Much progress has been made to this end. Not only telephone operators but all telephone employes—who install telephones, construct plant, make repairs, take orders for new service, receive collections and answer requests for miscellaneous information—are known generally for their courteous and considerate treatment of those with whom they transact business and meet in the course of their work."

Stating that perhaps nothing in recent years has had more influence in human affairs than the far-reaching change in the speed and scope of communications, Mr. Gifford continues:

"News of what happens anywhere in the world is almost instantly known everywhere by wire and radio. Practically anyone, anywhere, can send a message to or can converse promptly with anyone, anywhere else in the civilized world. Also, one can address in person an audience of tens of thousands by means of electrical loudspeakers. One can address an unseen audience of tens of millions by radio.

Movies are heard and seen almost everywhere. Pictures are transmitted practically instantaneously, and the scientific possibilities of television are developing into practical accomplishments.

These developments—all of which are relatively new, and many of which are very new in human affairs—are of tremendous importance to the peaceful arts, to the national defense and to the future of mankind. The Bell System is keenly aware of its responsibilities for leadership in its field of communications."

Taking up dependability as an essential of good telephone service, mention is made of provisions for keeping the telephone service functioning even under most unusual conditions.

"Despite the extensive precautions taken, despite man's best efforts, the destructive forces of nature sometimes prevail," Mr. Gifford says. "Disasters occur and telephone service is interrupted by fire, flood, sleet or wind. It is in these emergencies that the great value to the individual, to the community, and to the nation, of the Bell System's integrated nation-wide operating, supply, and manufacturing organization is strikingly illustrated. . . .

"Over the years the destructive effect of fires, floods, tidal waves and hurricanes has visited one part of the country or another. The damage in 1938 was the most extensive ever experienced.

Early in the year torrential rains and floods caused widespread service interruptions in Southern California. In September, all the destructive forces combined, causing a disaster in the eight northeastern states affecting the greatest number of telephones and communities since the telephone was invented. More than half a million telephones were silenced, 240 communities were isolated.

The wreckage of telephone plant put the Bell System to the greatest test it has ever been called upon to face—a test of the organization, of its men and women and of its resources of equipment and supplies. . . .

The Bell companies in the stricken area, assisted by the resources of the entire Bell System, successfully met the challenge of the catastrophe and earned the thanks of a public which had first-hand knowledge of the difficulties to be overcome. The telephone men and women, unmindful of hardship, carried on with resourcefulness and courage. The result was an almost impossible job splendidly done."

COMING CONVENTIONS

Texas Telephone Association, Baker Hotel, Dallas, March 22, 23 and 24.

Oklahoma Telephone Association, Huckins Hotel, Oklahoma City, March 27 and 28.

Kansas Telephone Association, Municipal Auditorium, Junction City, March 30 and 31.

Missouri Telephone Association, Hotel Muehlebach, Kansas City, April 3 and 4.

Nebraska Telephone Association, Lincoln Hotel, Lincoln, April 11 and 12.

Iowa Independent Telephone Association, Fort Des Moines Hotel, Des Moines, April 18-20.

Ohio Independent Telephone Association, Deshler-Wallick Hotel, Columbus, April 25 and 26.

Indiana Telephone Association, Claypool Hotel, Indianapolis, May 10 and 11.

Conference of class A and B member companies, U. S. Independent Telephone Association, Chicago, Stevens Hotel, May 15 and 16.

Pennsylvania Independent Telephone Association, Yorktowne Hotel, York, May 18, 19 and 20.

New York State Telephone Association, Hotel Syracuse, Syracuse, May 23, 24, 25 and 26.

The Illinois Telephone Association, Pere-Marquette Hotel, Peoria, June 7 and 8.

Wisconsin State Telephone Association and Wisconsin Locally Owned Telephone Group, Park Hotel, Madison, June 13-15.

Research and development in the Bell Telephone Laboratories have been carried on without diminution, it is stated in the report. During the year, many noteworthy investigations designed to improve, extend or lessen the cost of providing telephone service have been brought to the stage of practical applicability.

In local service, experience in the operation of the two installations of the new "crossbar" system of machine switching has been so satisfactory that the system has been standardized for future use in the large city districts. Shipment of equipment to provide for 23,000 subscribers' lines was made in 1938 and equipment for 165,000 lines is scheduled for 1939. Development is under way to extend the use of this system into other fields.

In the field of transmission, broad band systems by which a large number of telephone channels can be provided over a single circuit have proven their ability to meet exacting service requirements and are now going into extensive commercial use.

Research work on the laboratory experimental coaxial cable and its equipment between New York and Philadelphia has been pushed vigorously, it is stated, with the result that the first commercial trial installation—a 200-mile cable between Stevens Point, Wis., and Minneapolis—is now being engineered.

Research in the field of radio telephone transmission has been pushed, particularly in the direction of increasing the efficiency and reliability of transoceanic circuits in anticipation of the adverse conditions likely to obtain in 1940 and 1941 at the time of expected maximum effect of sun spot disturbance.

Notable in this work is the single side band method and the development of a highly efficient adjustable directional antenna. One of these antennae, two miles long, is now being installed on the transatlantic route.

"While telephone employment is relatively stable, it is nevertheless affected by changes in general business conditions which in turn react on the amount of telephone work," President Gifford comments, in a discussion of the Bell personnel.

"Thus with the improvement in business conditions, there was a net increase of about 14,600 employes in 1936 and 12,700 in 1937. With less favorable conditions in 1938, there

was a decrease of 11,000, and the total number of employes of the American Telephone & Telegraph Co. and the principal subsidiaries on December 31, 1938 was 257,400.

It is of interest to know what is happening in a relatively stable enterprise when there is a decrease in the number of employes. During 1938, 10,700 regular employes resigned, 4,100 were laid off, 1,900 were dismissed, 1,100 retired and 700 died. During the year, 6,500 regular employes were added. The turnover in this force was about 7 per cent.

There is quite a little seasonal and other temporary work and to handle this in 1938, 17,000 temporary employes were added to the payroll and 16,000 deducted, a net gain of 1,000 during the year. On December 31, 1938, there were 8,600 temporary employes. . . .

Present telephone personnel is the most experienced and seasoned that has ever provided telephone service. On the average, both men and women of the Bell System are now older in the service, as well as in age, than at any previous period.

Manufacturing work is fundamentally less stable than telephone operation. With any falling off in telephone growth, there is an immediate reduction in demand for new telephone plant and hence for manufactured products which go into that plant.

Much effort has been devoted to the problem of reducing fluctuations in telephone manufacturing employment and progress has been made. Further improvement is hoped for and every effort is being directed to that end."

Wage-Hour Hearing Not To Be Held March 9

The hearing before the Senate committee on the proposed amendment to the Wage-Hour act will not be held March 9, as was hoped. The earliest the national association committee expects a hearing is about March 23. Notice will be given when the date is definitely known.

The Operators' Corner

By MAYME WORKMAN

Traffic Supervisor, The Illinois Telephone Association, Springfield, Ill.

Recent Additions, Revisions and Amplifications to the Toll Operating Practice.

THIS is a review of the changes in toll operating methods which became effective on January 15 of this year.

TOLL CREDIT CARD PLAN: In order that representatives of business firms or other customers, who use toll service frequently when traveling, may place calls from telephones other than coin stations and have the charge for such calls included in the monthly bill for their home office telephone service, arangements may be made between the telephone company and business firms or individuals to provide such service.

Under this plan calls from any Bell System station, other than a coin station, are accepted. But calls *from Independent or so-called "connecting company" stations are not accepted.*

CALLED PARTY THERE BUT IS UNWILLING OR REFUSES TO TALK: The phrase formerly used when dismissing the called party when unwilling to talk was: "Thank, you. If anything further is desired, I will call you." This has been shortened to: "That is all, thank you."

The following instruction has been added in connection with handling a call where the called party is there but refuses or is unwilling to talk: If the operator receives no response to the question, "Would you care to talk later?" she will assume that the called party has hung up and will clear the circuit. Then, if the calling party is holding the line and does not cancel the call but asks the operator to make a later attempt, she will make the necessary ticket entries in accordance with the calling party's request, and will send the ticket to the proper point-to-point or delayed ticket position.

CALLED PARTY NOT THERE: When an operator is handling a recurring call, and she knows from experience that the questions usually asked—such as, "How soon do you expect him?", "Do you expect him today?", etc.—will result in securing no helpful information from the called station, the operator may omit them.

However, if the called party is in a distant place other than the called place, or is enroute to such a place, only the question "Where can he be reached in (different place)?" or "Where will I be able to reach him in (different place)?" should be asked.

"Do you expect him tomorrow?" is again included in the list of suggested questions. This question may be asked if the called party is not expected on the same day and no mention is made of a definite time, or a statement that a definite time cannot be given.

"Can he be reached at another telephone?" This question may be omitted if the called party is expected back within a few minutes or is at lunch.

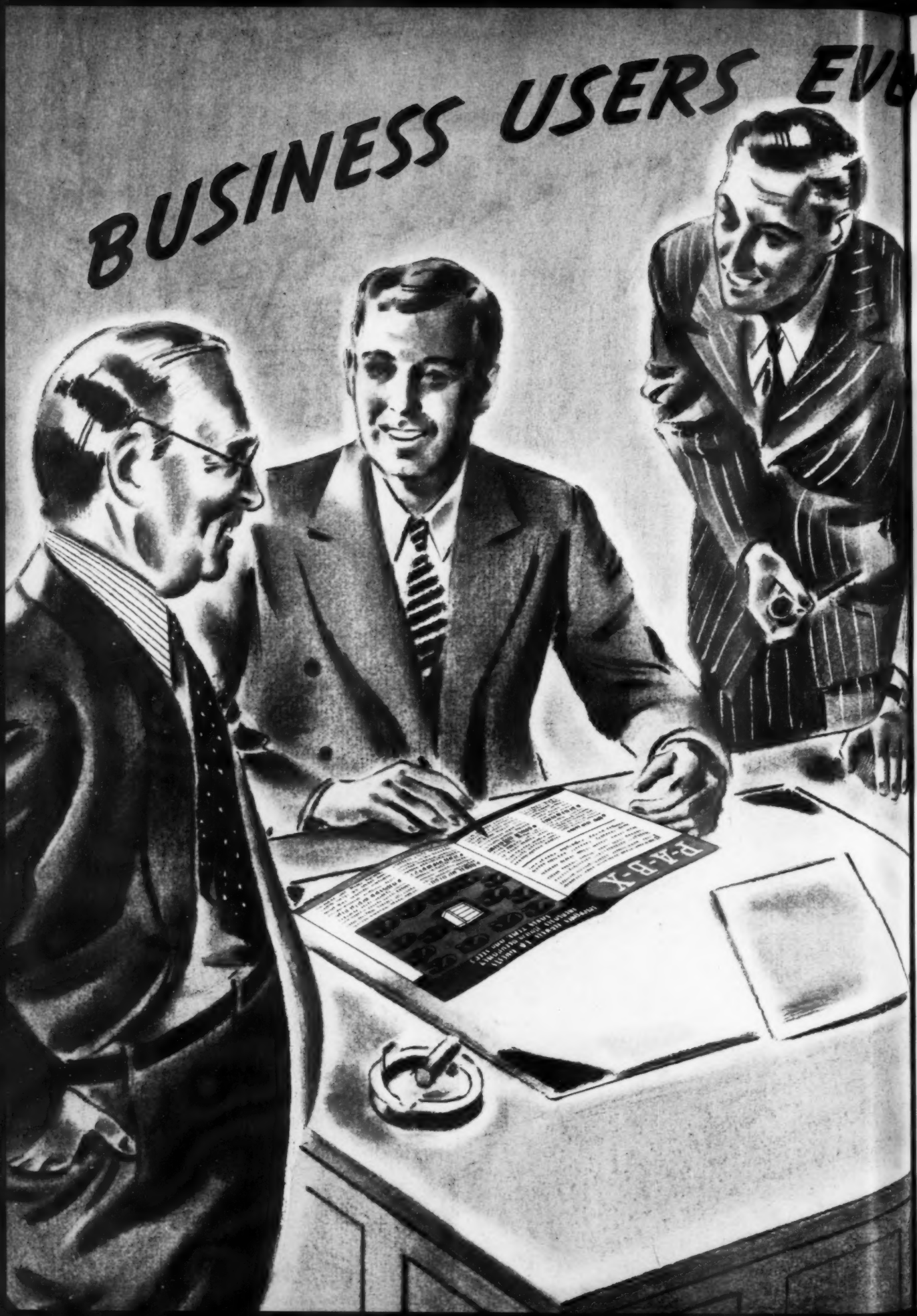
ALTERNATE OR ADDITIONAL PARTY SPECIFIED BY CALLING PARTY: If an alternate party was specified when the call was placed and a report is received about either or both parties, the report entry should be identified with the person concerned by including his name; for example, "Brown u 1 hr (time)."

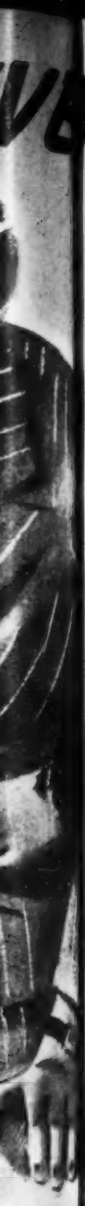
In next week's series, we will continue with and conclude the recent additions, revisions and amplifications to the Toll Operating Practice.

Questions from Illinois Operators

1. If calls are placed a few minutes before seven o'clock, should the operator tell them the night rate would be in effect at seven?
2. Why a report charge on a collect call when charges are refused?
3. Should "PN" be entered in the space for reports on the face of the ticket or on the back of the ticket?
4. What does multi-switch mean?
5. What information is necessary on the face of a ticket when a party is to report ready to talk?

The answers to these traffic questions are given on page 26.


BUSINESS USERS EVE
P-A-B-X



EVERYWHERE ARE SAYING—

"P-A-B-X Service is just what we need!"

"Our business has outgrown the horse and buggy stage. We should have modern automatic interior communication—instant service for everyone in the organization, day or night.

"With our interior calls handled automatically, our operator can give her full attention to important outside calls, and will have time to give courteous attention to our regular telephone customers, as well as to new prospects who call in.

"Our organization needs modern P-A-B-X service, and I suggest that we sign up for it at once!"

This is typical of the attitude expressed by most business men, when the many advantages of modern Automatic Electric P-A-B-X service are explained to them. Telephone companies in every part of the country are finding that educational campaigns, which instruct present and prospective private exchange users in the features of modern P-A-B-X service, result in increased demand for this service and proportionate increases in private exchange revenue.

Not only large organizations, but small businesses and professional offices as well, are active prospects for P-A-B-X service. Many of the latter classification find that they can afford unattended P-A-B-X service, where ordinary P.B.X. operation is out of the question due to its necessity for constant attendance. . . . Ask our representative to show you the free literature which we will supply to help you in this work, or, if you prefer, write to us direct for full information.

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Plant Men Get Together

'Way Back When—Linemen Lived in Boarding Houses

BY DOC, THE TROUBLE SHOOTER

Back in the dim past when I was floating around the country doing telephone work, most every town of any size had a regular telephone boarding house. This condition was brought about by necessity for, in most cases, hotels refused to provide us with accommodations.

Hotels in general didn't relish the idea of a bunch of linemen coming in, dragging a lot of line tools, scratching up the furniture, and occasionally burning the beds with cigarettes. In those days line gangs considered it necessary to take everything, excepting the mules, into their rooms.

Some towns were an exception and in those places a certain hotel would be our hangout. Occasionally we would find an ex-lineman or an ex-foreman running a small hotel; in such event he naturally got our patronage. I remember one lucky foreman who married a widow running a small hotel, and we linemen just took the place over.

The unmarried men of the exchange maintenance force generally took up permanent residence at boarding houses. These establishments were never run exclusively for telephone men; but when they liked a certain place, they practically took it over.

I have lived in many of these telephone boarding houses and can still visualize the white iron bed with a small rug at one side; the corner with a curtain across it with hooks upon which to hang clothes; a bowl and pitcher on the dresser with a "spotted" mirror.

I also remember waiting my turn for the bathroom; and woe was it to the man who did not take his proper turn or overstayed his time limit. Singing in the bath was permitted, but it had to be good.

We were always admitted to the bathroom according to our seniority in residence. If a man left he always lost all rights and was required to start from the bottom again when he came back.

These boarding houses were generally run by an elderly woman whom we all called "Mother." She was, in fact, a mother to all of us, although she religiously made us pay every cent we owed her each payday. She had probably learned from experience that this rule had to be strictly observed, for let a lineman get by one payday without squaring all his bills and he probably would never again be able to pay in full.

The meals were generally good, everything considered, but we made it a point to always growl about everything and never to admit that anything was actually good. That was our privilege but let an outsider—such as a stray railroad man who would occasionally move in—say one word in complaint and we surely made life miserable for him. Usually his stay would be short anyway, and this was exactly what we wanted.

When we were working toward a town with a toll gang where one of these boarding houses was located, the foreman generally called in with the test set about noon on the day before we expected to arrive and inquired as to how many men could be accommodated. If the entire gang could not be cared for, the older men would move in and the others would be forced to find another place. They generally used the regular boarding house, though, for all their heavy loafing.

The life of any telephone man was hard in those days, especially if he was of the floating variety and lived in a suitcase. Many telephone men did just this thing, for the exchange maintenance forces in the past were not so well qualified to do things for themselves as they are at the present time.

An equipment man would swing around his circuit several times a year and look over switchboards; a power man would do the same thing for the battery and charging equipment and ringing generators, and a cable man would inspect the cable. The district plant chief, commercial superintendent and traffic chiefs would also make periodic visits.

Although travel was difficult, hotels generally bad and the work hard, these men were cheerful and did a good job at all times. They were no doubt outstanding men. This was proved by the fact that they all moved on in later years into bigger jobs with the company.

▼ ▼

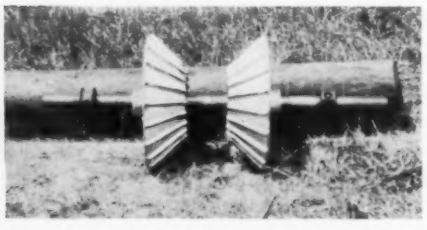
Sleet Storm Takes Down Older Leads

Sleet storm damage is always serious, for the small telephone company as well as the large one. A recent sleet storm in Minnesota took down 35 poles in a row on a rural lead of the Hector Telephone Co. This particular lead, which suffered the most of the company's leads, runs north from Hector.

The same lead was down in a sleet storm in March, 1920. One of the accompanying illustrations shows a section of that lead. At that time the poles carried two six-pin crossarms. Since then three 10-pin crossarms have replaced the six-pin arms, due to added circuits and also conversion of grounded circuits to metallic.

The section of the lead in the photograph taken in 1920 withstood the 1939 sleetstorm, as shown in the photograph taken at the same point. This part of the lead stood up under the

A NOVEL POLE SETTER



A novel device for setting poles, recently placed on the market, is mounted in a frame attached to the front of a truck. With its butt at the hole, the pole is raised to such a position that it rests in the center of the pole setter, the pole being kept from slipping out of the device by means of the side flanges. As the truck is driven slowly toward the hole, the pole is gradually lifted to an erect position and slides into the hole.

HIGH STRENGTH *plus Low Resistance*

Crapo HTL–85 TELEPHONE WIRE

Manufacturers of
***Crapo* Galvanized Telephone Wire and Steel Strand**

You now can build *better* telephone lines than ever before—at lower cost.

Specify *Crapo* HTL-85, the new, high-tensile, low-resistance, galvanized Line Wire! Its high strength makes possible *longer* spans, with fewer pole structures, on new construction; provides *stronger* spans, increases the factor of safety, on existing lines of standard span length.

Crapo HTL-85, because of this extra strength, withstands heavier ice and wind loading, minimizes service interruption, reduces maintenance expense. Its telephonic characteristics are superior to the usual accepted standards. Transmission losses are low. Signaling qualities are excellent.

The development of *Crapo* HTL-85 Line Wire, after years of research, marks the most revolutionary advance in the manufacture of ferrous telephone wire since the inception of the industry. Technical information and data are available in bulletin form. Write—

INDIANA STEEL & WIRE COMPANY · MUNCIE, INDIANA

'My learning is play, my play

THE **STROWGER** TWO-MOTION DECIMAL **SYSTEM** IS THE LOGICAL SYSTE

...as learning' —Van Alphen

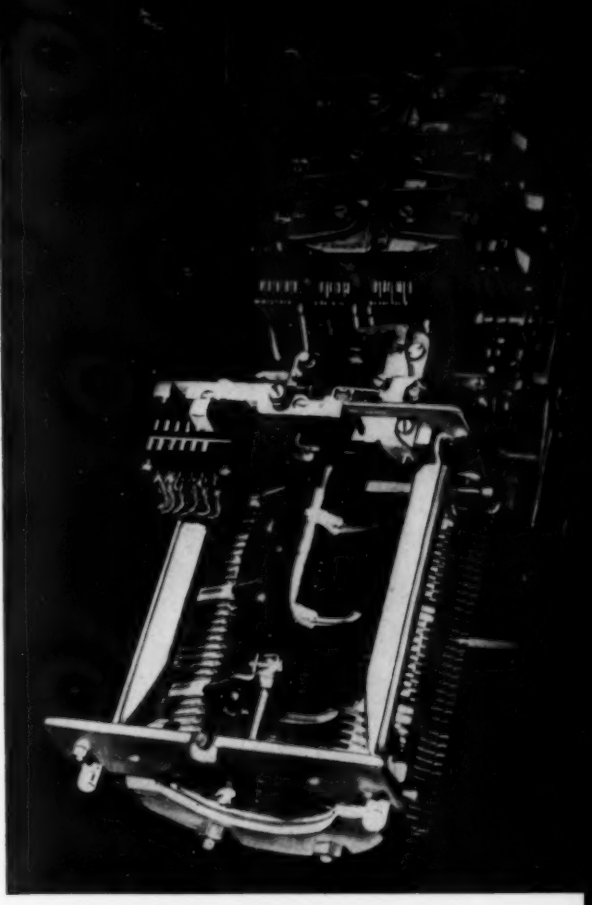
This aphorism of a Dutch philosopher is never more apt than when applied to the twentieth century child, as he first takes an interest in a Strowger automatic telephone. He has been learning to count with the ten rows of ten beads on his playroom abacus, but little does he realize that its principle forms the basis upon which the telephone switches operate in response to the movements of the little dial.

One day he may learn that this is not coincidence, but that Strowger automatic telephones employ the decimal system of subscriber selection because it is the most logical, the most efficient and the most easily capable of adaptation to every new requirement in automatic telephone switching.

This fundamental soundness of principle has greatly helped to make Strowger Automatic Telephony the world's standard today. Three out of every four of the automatic telephones in use throughout the world are Strowger and they are providing the highest possible standard of service under the most diverse conditions imaginable, for they are in use in some 70 different countries, each of which has its own peculiar climatic and operating characteristics.

Strowger Automatic Telephone Equipment has been supplied from Strowger Works, Liverpool, to many of the greatest State and Private Telephone Administrations, including The British Post Office, The Polish State Telephone Administration, The Lithuanian State Telephone Administration, The Portuguese Government, The Anglo-Portuguese Telephone Co., The South African Post Office, The Australian Telephone Administration, The New Zealand Telephone Administration, The Indian Post, Telegraphs and Telephones Department and the Bombay Telephone Company.

The latest, and greatest, improvement in Strowger telephony, The Strowger 32A Selector (B.P.O. Type 2000) has a number of advantages covering both operating characteristics and construction. It hunts at a much increased speed. It operates over wider limits of impulse speed and ratio variation. Its cubic capacity is just over half that of the previous model, yet it can accommodate many more contact banks and is even more robust. It can be removed and replaced with ease . . . and—it operates on the decimal basis which has emerged triumphant from all attempts to find another principle capable of supplanting it.



• THE STROWGER 32A SELECTO

We count in tens because our ancestors counted on their fingers. Whilst this served for the purpose of making rough reckonings it was of no use for recording numbers, and to make a permanent note of numbers some kind of mark or tally became necessary and has been necessary right through the ages. Today we use a series of figures commonly described as "Arabic," but in past ages all sorts of queer symbols were used. One or two comparative examples of very early figure characters are shown below.

	SYRIAC	PALMYRENE	PHOENICIAN	HIERATIC	HIEROGLYPHIC
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

AUTOMATIC TELEPHONE & ELECTRIC CO. LTD.

NORFOLK HOUSE, NORFOLK ST., STRAND, LONDON, W.C.2, ENGLAND • Cables, "Autelco, London"

STROWGER WORKS, LIVERPOOL, 7, ENGLAND

load of ice on the wires because of the poles being reset about five years ago, due to road widening. It will be noticed that the 1920 sleet storm took place in the "horse and buggy" days.

Manager A. L. Erickson of the Hector company, in an article published in the Hector Mirror, estimated that the weight of ice on the 30 wires between poles was 1240 pounds. The ice and wires had a diameter of about one inch. Icicles three inches long and about one inch apart, and joined together, hung from the wires.

The company has about 750 miles of rural line wire but outside of the one large gap of 35 poles, the remainder of the leads stood up well, only a few poles here and there going down. This was due in general to the fact that the leads have been rebuilt within the past four or five years.

ANSWERS TO TRAFFIC QUESTIONS ON PAGE 19

1. No.
2. This charge is made for the work time and toll circuit time involved in attempting to complete the call.
3. This entry is made on the back of the ticket.
4. In general, any call handled over a connection built-up through more than one office by means of ringdown toll circuits and ringdown trunks, or ringdown toll circuits alone, is considered a multi-switch call.
5. The following information is recorded on an Out toll ticket: The code "WH" in capitals in the "Spec. Inst." space; the called party's number; the called party's name; the name of the calling place; the distant operator's number; the filing time and your operating number.

The photograph shown below was taken nearly 19 years ago, after a destructive sleetstorm. Snapshot to left was taken in January of this year at exactly the same point. The poles in this section were reset about five years ago on account of the widening of the highway.

Repair gang of the Hector Telephone Co., of Hector, Minn., ready to begin the task of restoring service, after recent sleetstorm had levelled to the ground a portion of the same lead rebuilt 19 years ago, after a sleetstorm.

One lead that stood up—a two crossarm lead, rebuilt about five years ago.

This is the same lead that was rebuilt in 1920, after a destructive sleetstorm. This snapshot, taken after the recent sleetstorm, shows icicles three inches long, about an inch apart and joined together, making too heavy a load on wires, pins and poles.

TELERING

ECONOMY ◆ RELIABILITY

Order One NOW for a 30-day Free Trial

ONLY ONE CONTACT!

PRICE $44.00 EACH
F. O. B. Elyria

Reliable ringing service is essential in providing satisfactory telephone service.

Use TELERING and provide the MOST reliable service at the LEAST cost.

Current Consumption negligible.

Positively No Radio Interference

Directly converts Commercial Alternating Current to Telephone Ringing Current.

You can always depend upon our full co-operation and prompt service.

Sold by Leading Telephone Distributors

TELKOR, Inc., ELYRIA, OHIO

GET THE FULL BENEFIT OF YOUR SUBSCRIPTION

You would appreciate TELEPHONY more if you systematically saved each copy after you had read it. Often, you have no immediate need for the information contained in the article you are reading, but it will prove invaluable two, four or six months later. Requests for back numbers of TELEPHONY prove this.

Realizing that we could be of considerable assistance to our readers if we could provide an easy, simple method of saving the magazine, we decided that a binder designed to our purpose would do just that very thing.

We can now offer to our readers a very practical binder—one that will enable you to insert each magazine into the binder after you have read it, without punching or mutilation of any kind. No cutting or pasting is necessary. No more dirty, torn or dog-eared magazines. The magazines can be removed at any time later if desired. You have the complete six months file of copies for ready reference.

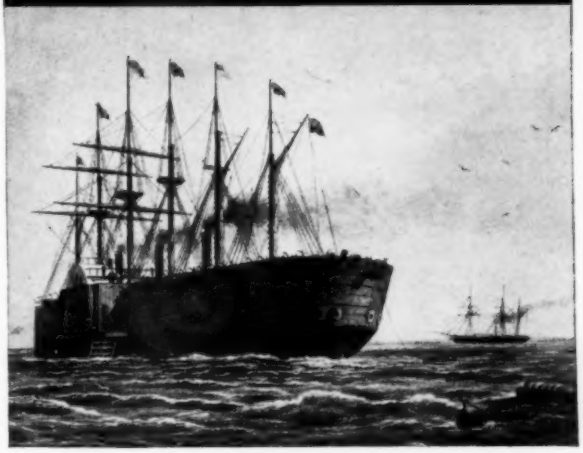
The binder is made of durable, leather grained imitation leather over stiff boards. It would be an attractive addition to any home or library.

You will get full value out of TELEPHONY by saving your copies. The binder costs only $2.50 and it will last for many years.

ORDER NOW.

TELEPHONY PUBLISHING CORPORATION
608 S. Dearborn St. Chicago, Ill.
Wabash 8604

"A CABLE ACROSS THE ATLANTIC ... *what next!*"



IN 1869...three years after the Great Eastern's historic cable-laying task was completed...we launched our own electrical business. And in the early '80's we began supplying cable to America's infant telephone industry.

Today this service of supply...now Graybar...distributes everything electrical for telephone company buyers everywhere. Whatever your electrical need...pole line equipment...wire...tools ...Western Electric cable...you'll find it among Graybar's 60,000 items.

And you'll find it conveniently available through a nearby Graybar warehouse. You'll find, too, that equipment from Graybar is *reliable* equipment... backed by Graybar's 70 year reputation for dependability.

OFFICES IN 83 PRINCIPAL CITIES • EXECUTIVE OFFICES, GRAYBAR BUILDING, N. Y.

Here and There in Telephone Work

Operators Get to Work in Snow-Bound Chicago

On the morning of January 30, following the heaviest snowfall on record in the Chicago area, city and suburban operators of the Illinois Bell Telephone Co. displayed a true spirit of business service.

Cases of resourcefulness, courage, and in some cases actual heroism, were not uncommon among the operators and the other members of the traffic personnel who, knowing instinctively that their services were badly needed, endured many hardships to reach their posts of duty. While statistics are not available undoubtedly more telephone employes reported for work than employes in any other business in Chicago.

Hundreds of girls left their homes before daylight, and finding every means of transportation slowed down or halted, they hitched rides on anything that moved in the direction they were headed, or trudged on foot in the darkness, through deep drifts of snow and against biting winds. A few turned back—but only to remove their soaked clothing and put on dry outfits.

Girls arrived at their exchange buildings singly and in twos and threes and were in some cases bedraggled and almost exhausted from miles of hard hiking—but uncomplainingly they took their places at the switchboards as soon as they were permitted.

"How did you get here?" was a much-repeated question, as girls — many of them living miles from their offices — arrived. The explanations were numerous and varied. One operator who lived in Berwyn tried the elevated, then a bus, then hitched rides on a newspaper truck, a milk wagon and finally a private car.

Another girl was standing on a street corner four miles from her office when a car drove up. "Where do you work, Miss," the driver called. "Telephone company," she replied. "C'mon then," replied the motorist, "They'll be needing you down there." Though it was out of his way he took her to the office door.

Another girl was on an L train that crashed. Unhurt, she got to the office. Another got a lift in a private car which stalled. A large truck, out of control, ran into and overturned it. Both she and the driver were unhurt and after some difficult hiking she reached the office.

Such spirit, energy and resourcefulness enabled the Illinois Bell Telephone Co. to satisfactorily handle the great avalanche of calls. In Chicago, local calls handled approached 5,500,000, a 35 to 40 per cent increase over the normal volume of just under 4,000,000. During the heaviest hours of the rush the load reached 100 per cent above normal.

▼ ▼

Where Did We Make Mistakes in Our Sales Efforts

By Dwight Abbott

When he has acquired a headache over the loss of a promising advertising copy sale, it behooves the telephone directory advertising manager to call a halt and check up, to take an objective view of his work. One official who worked out a regular questionnaire on a printed form for this purpose, found that it pays to make a check-up. The form may be used for periodic checks on individual sales efforts, or it may be used with salesmen for quiz purposes, from time to time.

The essence of the questionnaire was that it went straight to the heart of the problem. No punishment was threatened, and the questionnaire served as a check-up on sales manager and salesman alike.

It had a very stimulating effect, this advertising manager reported. It brought home to the salesman the fact that there are many avenues to the loss of a sale, just as there are many to the winning of one. It reminded salesmen that each sale of any importance may be made a well-rounded program in itself. As such, the questionnaire served admirably for training purposes with young salesmen.

Following are some of the questions raised in the report sheet:

Does the dealer who turned you down do any advertising at all?

Does he believe in it?

Did he prefer some other form of advertising? If so, why?

What specific reasons did he give for not wanting telephone directory advertising?

What type of person was the customer? Did you take this into consideration?

Was there any approach you avoided? Why? Was there any you might have used instead?

What sales resources (testimonials, samples, etc.) did you use?

Were there any resources you didn't use?

Frankly, was the loss of this possible sale due to failure of telephone advertising to sell itself, or to your selling methods?

It is to be noted that emphasis is laid not only upon the advertising copy to be sold, but the personality of the customer to whom it is offered. "A salesman's knowledge of his customer —his appraisal of the customer in making the approach—is one of the vital factors in modern scientific selling," this advertising manager pointed out. Continuing, he said:

"We feel it is just as logical to train salesmen to sell scientifically, as to use science in production. This means that a man can acquire skill in judging personalities; and this he must do, before he can hope to rise above mediocrity in selling.

In other words, he must be able to recognize the manner of man he is dealing with—whether a man of quick or slow decisions, broad viewpoint or an observer of details—and he must know the proper method of dealing with each of these types.

The day is gone when good salesmanship is to be promoted through high pressure methods—with the salesman or with the customer. Each salesman is, himself, an individual problem; what produces results for one salesman may not do at all for another. We now recognize this problem earlier in the training career of the salesman than we used to.

Success of the sale depends on the salesman's ability to make use of his interpretation of customer personality. If, through use of a questionnaire of this type, we have at least brought home the importance of the problem, our job is at least half done."

▼ ▼

1937 Census Figures on Telephones Made Public

According to preliminary figures compiled from returns of the recent quinquennial census of telephones the number of telephones and the operating revenues of telephone companies in the United States increased slightly more than 11 per cent between 1932 and 1937.

The 1937 census of telephones was limited to public telephone systems and lines operated within the continental United States and did not cover the

following: lines operated by federal, state or municipal governments; certain private lines—for example, those used exclusively by railroads for dispatching and operating trains and those connecting branches or departments of manufacturing or mercantile establishments, hotels, mines, and lumber camps, etc. In addition, data for 11,759 connecting lines having fewer than five telephones per line were not included in the detailed summaries and tabulations.

According to the returns received from 38,801 systems and lines, not including data for the connecting lines having fewer than five telephones, the total number of telephones in use in the United States on December 31, 1937, was 19,424,200, compared with 17,424,406 on December 31, 1932, an increase of 11.5 per cent. Telephone

SPOTLIGHT POPULARITY

By ANNE BARNES

Traveling Chief Operator, Iowa Independent Telephone Association, Des Moines, Iowa

"OH, POPULAR APPLAUSE! What heart of man is proof against thy sweet, seducing charms!" But, after the cheering is over and all the pretty speeches have been made to the one in the spotlight, he or she will do well to remember that there is nothing more doubtful than the minds of a multitude of people. In a miscellaneous group of people there are sure to be many minds; minds that are prejudiced, jealous, self-seeking, ignorant; and minds open to deserved convictions.

An operator once remarked, "At one time we had an operator in our exchange who was very popular with most of our subscribers, and many of the regular salesmen who placed lists of toll calls on certain days."

As she did not go on, I asked: "What became of such a valuable operator?"

"She accepted a position in one of our banks and took her spotlight along," she continued. "But, really, she was not popular with our office force. She was always telling us what the grain man had said of her speedy way of handling his lists. (We had to do all the other work while she was busy with his calls.) Again Hetty would step into the spotlight and tell us how Mrs. So and So depended on her; how others would say, 'Let me have Hetty'; or, 'Oh, you are back from your lunch, Hetty. I am so glad as I want to do some telephoning.'

"If we told Hetty we had handled the grain man's list while she was at lunch, she was very sulky.

When Christmas came most of the gifts from subscribers were addressed to Hetty Stone although, I am sure, all of us tried as hard as she did to give satisfactory service.

Of course, people missed Hetty after she was gone—for a long time, too. But, honestly, we have just as many nice things said of our service as we had when she was in the telephone exchange; and as many or more Christmas gifts. Now, what is the answer?"

Hetty was probably no better operator than the rest of you. But she had a way. She crowded herself past the rest of you and landed in the spotlight. When it moved, she moved quickly into it. You had the same chance—but I'm glad you didn't take it. She was more aggressive, more possessive than the rest of you. So customers saw only her in the spotlight, although the rest of you were plugging away just as hard as she was.

Group popularity indicates that customers have the same confidence in all of you rather than having the feeling that they must wait or call for a certain operator in order to get the best service.

MORAL: "Avoid popularity; it has many snares, and no real benefit. Seek not the favor of the multitude; it is seldom got by honest and lawful means. But seek the testimony of the few; and number not voices but weigh them."—Kant.

A GRIP FOR ALL NEEDS

No. 1628-5 B. "Chicago" Grip. Maximum opening .563. Minimum opening .115. Safe Load, 8,000 lbs.

Here's the new "Chicago" Grip capable of handling messenger or guy strand from 3/16 in. diameter up to 1/2 in. diameter. A genuine all purpose grip that can also be used satisfactorily on bare conductors, solid or stranded, from No. 6 to No. 4/0 seven strand copper and A.C.-S.R. up to No. 3/0. A grip that even satisfactorily handles the new three-strand "copperweld" conductor. The bronze-lined jaws prevent slippage. This new grip will afford a sure hold under all conditions, with loads up to 8,000 lbs.

DISTRIBUTED THROUGH JOBBERS

Foreign Distributor: International Standard Electric Corp., New York

The four pamphlets listed below will be sent without charge to anyone interested. Check the ones you want:

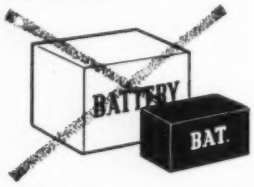
- ☐ Safety for the Pole Climber.
- ☐ Specifications on Linemen's Belts and Safety Straps.
- ☐ The Safety Factor on Linemen's Leather Goods.
- ☐ Pocket Tool Guide.

Mathias KLEIN & Sons
Established 1857 Chicago, Ill. U.S.A.
3200 BELMONT AVENUE

New

The Raytheon RECTICHARGER is the new way of furnishing DC power used by the largest telephone companies to make their service more reliable and to save money.

It is not to be confused with a battery charger.



It supplies the normal load, permits the use of smaller batteries and lengthens their life.

The only servicing required is the occasional addition of water to the battery to replace evaporation.

A RECTICHARGER with a small storage battery floating across its terminals makes a complete, automatic AC-DC telephone power unit. Its DC voltage is stabilized to ±2% at any output even although the AC varies from 95-130 volts. It uses lifetime, dry disc copper oxide rectifying units. There are no moving parts. For full details consult your usual source of telephone supplies or mail the coupon.

RAYTHEON MANUFACTURING CO.
172 WILLOW STREET, WALTHAM, MASS.

Please send Bulletin DL48-263-2 on RECTICHARGERS.

Signed .....

.....

operating revenues increased 11.2 per cent, from $1,061,530,140 in 1932 to $1,180,028,372 in 1937.

Although the number of employes (reported for June 30) showed a slight decrease of three-tenths of one per cent, from 334,085 in 1932 to 333,162 in 1937, the salary and wage payments increased 12.8 per cent during the same period, from $458,116,677 to $516,640,009.

Including the 29,201 telephones reported for the 11,759 connecting lines having fewer than five telephones each, the total number of telephones in service December 31, 1937, was 19,453,401.

▼ ▼

Changes Made in Chicago's Telephone Directory

Chicago's alphabetical telephone directory has had its face lifted (its type face) and the telephone company states it will be easier on the eye—easier to read and consult. It has about 640,000 listings.

The improved type face was designed by experts in the art after long study in collaboration with telephone directory engineers. More white space shows around each letter, and certain characters like the small "g" and the small "a" have been simplified so the eye recognizes them more quickly. Also there is greater contrast between the name portion of the listing and the address.

Surnames of subscribers are repeated on every line instead of being shown once for all persons having that family name. The new book has four columns to the page instead of five and, therefore, appears less crowded. This improvement has been made with practically no increase in the number of pages.

▼ ▼

Business Still Profitable After 30-Years' Operation

About 30 years ago a group of residents in the community of New Burlington, Ohio, organized the Mutual Telephone Co. Now known as the New Burlington Telephone Co., it still finds operation of the exchange profitable and is financially out of the red regardless of the fact that it serves only 125 subscribers. Revenues derived from the subscribers on the basis of $1.50 to $2.00 monthly rates maintain the plant and service as well as giving a return to the stockholders on their investment.

The plant and exchange are located in the residence of Mr. and Mrs. Kellie S. Bone in the village, of New Burlington, who are manager and secretary, respectively.

Mr. Bone, who is lineman as well as manager, has had 25 years' of telephone experience and has been associated with the New Burlington company for five years. Previously, he held the position of manager of the Port William Telephone Co.

In addition to her duties as company secretary, Mrs. Bone serves as an operator. She and her husband share responsibility for the switchboard to give uninterrupted 24-hour service. Other operators on full-time are Miss Marjorie Haydock and Miss Leona Miller, with Miss Georgeanna Weaver as substitute operator.

Officers of the company are Clarence H. McKay, president; Weldon N. McKay, vice-president; Mrs. Ada M. Bone, secretary, and Walter V. Lackey, treasurer. Mr. Lackey was one of the original directors of the company.

▼ ▼

Public Pay Station Booths in Great Britain

Telephone kiosk service is more extensive in Great Britain than in any other country. It has some 45,000 public telephones (of which about 23,000 are in kiosks) producing revenue of about $8,500,000 annually or an average revenue of about $185 a year each. This compares with the average revenue derived from the subscribers of about $85 a year.

A new type of kiosk has recently been introduced. It was designed by Sir Giles Gilbert Scott and has the approval of the Fines Arts Commission, the Councils for the Preservation of Rural England and Wales and the Association for the Preservation of Rural Scotland as being suitable for all parts of the country.

The interior fittings have been specially designed and it contains a shelf and receptacles for parcels. There is also a mirror, and in this connection the British Post Office has been given unexpected credit for being a psychologist of the first order.

It is said that, knowing the pixilated have a habit of indulging their craze for doodling on the walls of kiosks, the Post Office has provided a mirror in order that they may be so fascinated by their own reflections they will forget to scribble.

▼ ▼

High Praise for U. S. Telephone Service

Madam V. K. Wellington Koo, wife of China's Ambassador to France, now visiting the United States, says: "The telephone service in America is wonderful. In France, when you swear at the telephone, it swears right back at you."

With the Manufacturers

New Sales Manager of National Telephone Supply

S. E. Wright, of Massillon, Ohio, has been appointed general sales manager for the National Telephone Supply Co., of Cleveland, to take up the work of

S. E. WRIGHT, new general sales manager of National Telephone Supply Co., Cleveland, Ohio.

the late C. C. Mahan. Mr. Wright's training and experience are believed to qualify him eminently for supervising the merchandising of National telephone line materials.

Until his recent appointment Mr. Wright was directing head of the power sales department at the Ohio Public Service Co. and was located at Massillon, Ohio.

▼ ▼

BOOK REVIEW

PROBLEMS IN PUBLIC UTILITY ECONOMICS AND MANAGEMENT (second edition) by C. O. Ruggles, Ph. D., professor of public utility management, Graduate School of Business Administration, Harvard University; published by the McGraw-Hill Book Co., Inc., New York. 772 pages. Price $6.

In the preface, the author of this volume directs attention to the increasing demand for men with an understanding of the economic and business problems of utilities, not only as public utility executives but also as consulting engineers, accountants, attorneys, legislators and members of commissions and courts.

The problems presented in this volume for analysis and possible solution are concerned primarily with economic and business issues. Technical and legal matters have been given consideration only as it has been necessary to furnish an adequate understanding of the economic and business issues involved.

The historical material contained in the first edition, published in 1933, has been condensed to provide for more emphasis upon issues which have taken on new significance in recent years. This is contained in section one of the new volume. Of the problems dealt with in the other six sections of the book, it is stated by the author that more than 20 per cent were not in the first edition and about 70 per cent have either been revised or represent entirely new material.

In the third section, "Management, Organization and Finance," under the sub-topic "Significance of Holding Company and Intercorporate Control of Public Utilities" is outlined the organization of the Bell Telephone System and the relations of the subsidiaries to the parent organization. The history of the license contract is traced and the relationship between the American Telephone & Telegraph Co. with the Western Electric Co. and the Bell Telephone Laboratories, Inc., outlined.

At the conclusion of the discussion on this sub-topic is presented the question: "Is there a need for a different type of organization and administration of the telephone industry than is necessary for other public utilities?"

Under the sub-topic of the A. T. & T. Co. and its principal subsidiaries is outlined and discussed the coin-box service rate case of the Illinois Bell Telephone Co. After devoting approximately six pages to the history of this case and to excerpts from court rulings pertaining thereto, the author presents, among others, these questions:

Is it in the interests of the public that the telephone business be controlled by a centralized management?

Was it necessary, in your opinion, to determine the profits to the Western Electric Co. from its sales to the Illinois Bell Telephone Co.?

Should the sums paid by the Illinois Bell Telephone Co. to the A. T. & T. Co. under the license contract be allowed in a computation of fair rates?

Another sub-topic of the third section of this new publication entitled "Holding-Company Management in the Independent Field" discusses the application made to the Indiana Public Service Commission, in 1928, by the Associated

SANDS

THE TYPE 12 SUB-STATION PROTECTOR

This popular type of indoor protector consists of two blocks of porcelain—the line end being equipped with fuse clips only while the other end has fuse clips, ground connection and a well for the discharge blocks. Regularly equipped with seven-ampere, fiber-type fuses with nutted ends, and Type 2105 discharge blocks. Write for further information regarding this and other Sands protective devices.

SANDS PROTECTION EQUIPMENT *is made by:*

AUTOMATIC ELECTRIC COMPANY

Distributed by:
AMERICAN AUTOMATIC ELECTRIC SALES CO.
1033 West Van Buren Street, Chicago

Export Distributors:
AUTOMATIC ELECTRIC SALES COMPANY, LTD.
Chicago

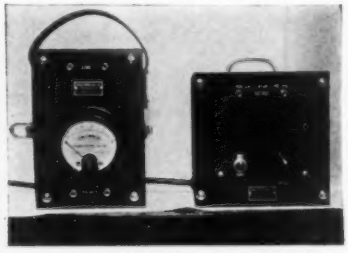
CONFIDENCE

For more than 30 years leading telephone engineers all over the world have shown their confidence in Cook terminal and protection equipment by specifying it year after year.

TERMINAL AND PROTECTION EQUIPMENT

TRANSMISSION TESTS MADE EASY

The Shallcross No. 690 Transtester (Decibel Meter) and No. 691 Tone Generator (1000 Cycle Oscillator) were developed to provide a convenient yet inexpensive method of measuring transmission losses in lines, switchboard circuits, apparatus and other equipment.



No. 690 No. 691

This testing equipment gives the wire chief a convenient method for making tests of the switchboard and main frame, testing cord circuits, picking up cable pairs and checking subscriber's lines.

Write for Bulletin No. 690CA

SHALLCROSS MFG. COMPANY
COLLINGDALE, PENNA.

Telephone Co. of Indiana for permission to purchase a number of small telephone properties in that state. After quoting from the opinion of the commission accompanying the order denying the authority petitioned for, the following questions are put to readers of this volume:

"Do you believe that rates would have been higher if the companies involved had been purchased by the Associated Telephone Co. of Indiana?

Do you agree with the reasoning of the commission in this case?

How do you appraise the policy of the management in this case?

Another telephone case is discussed under the sub-topic, "Finance" of the third general section—that of the Mondovi Telephone Co. before the Wisconsin Public Service Commission for authority to issue a common stock dividend in an amount not fixed, to be distributed pro rata among its stockholders.

A number of other typical commission and court telephone cases are reviewed in the fifth, sixth and seventh sections of the book, under the titles "Retail Marketing of Public Utility Service," "Valuation, Rate Making and Fair Return," and "Regulation and Management."

Commissions and Court Activities

Ohio Wage-Hour Bill Killed in Committee

Independent telephone companies in Ohio are drawing a breath of relief over the defeat in committee of the Wheatro bill offered in the Ohio legislature proposing a wage-hour administration similar to that imposed by the federal act.

The bill died in the hands of the labor committee of the house, where favorable action had been urged upon the committee by representatives of organized labor including both the A. F. of L. and the C.I.O. Employer organizations in various lines of business either spoke against the bill or sought exemptions for their particular industries.

▼ ▼

Reuben H. Donnelley Corp. Not in Florida Case

H. P. Harper, general manager of the Reuben H. Donnelley Corp., of Chicago — well-known publisher of telephone directories—directs attention to the fact that the Reuben H. Donnelley Corp. of Chicago is in no way connected with the Donnelley Publishing Co., of Tampa, Fla., against which the Peninsular Telephone Co. has filed suit for directory infringement.

An item regarding the filing of this suit was published in TELEPHONY of February 25, page 31. The court was asked to enjoin the Tampa company from publishing or distributing the "Donnelly's Yellow Book Criss Cross Directory."

▼ ▼

Pennsylvania Physical Connection Case Before Commission

The Pennsylvania Public Utilities Commission reviewed voluminous testimony and weighed oral arguments in an unprecedented test case, on February 21, to determine if the Bell Telephone Co. of Pennsylvania, has the right to refuse service to subscribers using equipment other than that manufactured by its affiliate, the Western Electric Co.

Oral arguments in the case, started early last year by the commission on complaint of McCloskey & Co., headed by Matthew H. McCloskey, Philadelphia contractor, were presented by A. Evans Kephart in Mr. McCloskey's behalf and by Benjamin O. Frick, in behalf of the Bell company.

Decision in the case, started after the Bell company had refused to connect a privately-owned switchboard in Mr. McCloskey's new Philadelphia office building, will determine whether customers may purchase their own telephone equipment, secure connections with the Bell System and pay a smaller fee for use of the lines.

One commissioner pointed out that the public utility law provides that the commission on complaint or on its own motion can direct a telegraph or telephone company to connect facilities with privately owned apparatus.

Counsel Frick, for the Bell company, asserted that a ruling forcing connection with a private switchboard would result in chaos in operation of telephone facilities. He contended it would necessitate "expensive" changes in central exchanges and otherwise interfere with the Bell's right of management.

Mr. Frick's argument was refuted by Mr. Kephart, representing the Falls Equipment Corp. of Philadelphia, and Mr. McCloskey. Mr. Kephart is an official in the Falls corporation, which sold and installed the PBX system in the Philadelphia office building to which the Bell company refused connection.

To Mr. Frick's claim that the section

of the 1937 utility regulatory act giving the commission power to require telephone companies to furnish connections with customer-supplied equipment was unconstitutional, Mr. Kephart replied that the act "does not represent an unlawful delegation of legislative power."

He asserted that equipment manufactured by the Falls corporation was equal in efficiency to that of Bell apparatus.

Chairman Denis Driscoll of the Pennsylvania commission reminded Mr. Frick that "you are making money on your monopoly." Other commissioners attempted to show that all telephone equipment, whether manufactured by Western Electric or other companies was standardized to conform with all the A. T. & T. Co. regulations.

Mr. Frick indicated that an adverse ruling would be contested in the courts.

▼ ▼

Halts Construction of Power Lines in Nebraska

The Nebraska State Railway Commission heeded the protests of officials of the Hamilton County Farmers Telephone Association against authorizing the Hamilton County Rural Public Power District to construct 201 miles of transmission lines, most of which paralleled the grounded lines of the company. They said that metallicizing the lines would cost them $27,000, and that being a cooperative they did not maintain any large reserve.

What had been maintained, they said, had been used last year to take care of sleet storm damage. They indicated that they wanted electric service but not at the expense of their $160,000 telephone investment.

The company is an unusual one. All of its stock is owned by 1,426 farmers who supply service at cost to business men and residents of all of the towns in Hamilton county.

The commission denied the request of the district to construct any of the parallels unless and until it had entered into an agreement with the farmers' telephone organization for financing the change to two-wire metallic service. The district thereupon announced that as REA would not allow it to use any of its funds for such purposes, it would not build in the disputed area.

A similar order was made by the commission in a case where the Eastern Nebraska Public Power District asked for authority to build transmission lines paralleling the rural lines of the Humboldt-Speiser Telephone Co.

In previous cases farmers have aided power districts in hearings before the commission where small telephone companies had protested their inability to meet the expense thrust on them by metallicizing their lines by testifying that they preferred electric service and would give up their telephone service first.

In the two cases just described, however, the two companies are owned entirely by farmers who objected to their investment being ruined.

At the hearing before the commission on February 23, Attorney Frazier of the Hamilton County Cooperative Telephone Association testified that the stockholders of the organization had voted three to one against signing a letter of waiver approving the proposed extension of power lines by the Hamilton County Rural Public Power District.

The attorney reported that the association has 2,038 telephone stations, 1,000 of which are rural. He testified that the rural rate is $1.15 a month.

D. M. Davis, manager of the Hamilton County company, stated that increased rates would not solve the problem as it was felt that higher rates would result in decreased total revenue due to loss of subscribers. He estimated that 527 miles of wire would need to be metallicized at a total cost of $27,000. He stated that at the present time the revenues and expenditures are about equal.

▼ ▼

Illinois Bell Wins $1,688,295 Unpaid Refund

Ruling, for the first time in the history of this country, on the unusual legal doctrine known as bona vacantia, the United States Circuit Court of Appeals in Chicago, on February 22, handed down a decision giving the Illinois Bell Telephone Co. the right to retain $1,688,295 of the funds remaining unclaimed from the original fund of $18,897,980 ordered refunded to Chicago subscribers as a result of overcharges between 1923 and 1934 on coin-box telephone service.

The legal doctrine known as bona vacantia was recognized by the common law of England prior to 1606. The theory invokes the doctrine that any ownerless property reverts to the state. The attorney general of Illinois argued that the unrefunded money was personal property without owners and, therefore, passed to the sovereign state of Illinois.

The court in handing down its ruling said: "The argument of the state, in our opinion, is predicated upon a foundation which is unsound in that

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the subscribers at the time when the state made claim, were neither in possession of nor owners of any property or right of claim thereto.

"Even before the period of limitation expired they were not, in true sense, owners of the fund or any part thereof. They had only a claim against plaintiff for a refund. A relation of debtor and creditor existed."

Petitions were filed by the city of Chicago, the state of Illinois, and the treasurer of Cook County in the federal district court requesting that the balance be turned over to them.

Pointing out that the telephone company had incurred expenses more than doubling the unclaimed fund in making the refunds, the statutory federal district court on December 23, 1937, held in favor of the company. This decision was appealed by the state of Illinois and has just been upheld.

▼ ▼

Telephone Bills in Oklahoma Legislature

Bills, which would impose heavy financial burdens on Oklahoma public utilities, have been introduced into the house of the Oklahoma legislature.

B.H. 342, introduced by Representative Hughes, proposes a 5 per cent excise tax on sales of all commodities and also on telephone and telegraph services. It would replace the present 2 per cent sales tax and would make the levy in such a way that the telephone company could not pass the tax on to its subscribers.

A revolving fund of $100,000 to be used by the Oklahoma Corporation Commission for investigation of public utility rates is proposed in H.B. 408, by Representatives Tankersley and High. This fund is to be created and replenished by assessments upon public utility companies in proportion to their intrastate gross earnings.

After the utilities had been assessed to create the fund, the corporation commission could, in addition, levy assessments on each utility which it decided to investigate in the amount that the commission should determine that the investigation of such utility cost. The utility may charge this expense to operating costs and amortize it over such period as the corporation commission might deem proper.

▼ ▼

Hearing on New Rates for Pennsylvania Suburbs Recessed

Hearing on a new suburban rate schedule submitted by the Bell Telephone Co. of Pennsylvania was continued indefinitely after counsel for consumers' groups cross-examined a company executive regarding the proposal at a hearing before the Pennsylvania Public Utilities Commission, February 3, pending further study of the figures brought out in the testimony.

Attorneys for various groups of consumers in the Philadelphia area questioned W. D. Gillen, vice-president in charge of operations for the company, concerning the proposed increase to foreign service exchange subscribers living outside the six-mile zone in cities of the state.

The proposed schedule would affect about 4,000 consumers in the Philadelphia suburbs and some in the Pittsburgh suburban area.

William F. Beatty, attorney for Pittsburgh consumers, attended the hearing as observer.

▼ ▼

Case Which Typifies Problems Created by REA

Brought to light at a recent hearing before the Nebraska State Railway Commission was a case that is typical of the situation in which many smaller telephone companies of the Middle West have been placed by reason of the paralleling of their grounded lines by electric transmission lines, built under the REA, and the refusal of the federal REA to pay the costs of metallicizing the telephone circuits.

The Humboldt-Speiser Telephone Co. operates 120 rural lines on a stock company basis in southeastern Nebraska. It has no exchange. It objected to the commission authorizing the Eastern Nebraska Public Power District to build a parallel of its main telephone lines for a distance of 25 miles.

To metallicize the lines would cost $1,200, and the company reports that it has no money at all. The Lincoln Telephone & Telegraph Co., which has lines in that section, looked over the property and told the owners it would not take it as a gift. The company officials tried to get a loan from the local banks with collateral in the form of revenues received from a 25-cent rate increase the commission said it would allow. The bankers said they would furnish the money if the farmers would sign as security.

The stockholders, distressed by economic conditions, cannot put up the money themselves. The REA refuses any assistance.

▼ ▼

Tax Suit Filed by Morrison, Ill., Company

The Morrison Telephone Co., of Morrison, Ill., recently filed a suit for injunction against the county clerk of Whiteside county to restrain him from making the tax exemption fixed by the Illinois Tax Commission. The complaint declares that the tax is fraudulent, excessive and not uniform, and the court is asked to equalize the valuation at between one-third and 40 per cent of the valuation set by the company, which is $146,865.

The tax commission fixed a valuation of $156,715 and set the tax valuation at 50 per cent of that amount, or an increase of $18,315 over last year. It is claimed that the average tax valuation fixed in the county is one-third to 40 per cent of the actual value.

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Summary of Commission Rulings and Hearings

Federal Communications Commission Washington, D. C.

February 16: The commission granted authority to the Southwestern Associated Telephone Co. to extend its toll line facilities located at Allred, Denver City, Bennett and Wasson, Texas, and connecting toll lines, with its Seagraves, Texas, exchange, for the purpose of serving patrons at the latter points with interstate toll service.

Georgia Public Service Commission

March 1: Hearing at state capitol in Atlanta on application of Dr. E. W. Watkins, owner of the Ellijay (Ga.) Telephone Co., operating 60 stations in a mountainous section of the state, for permission to increase rates and limit service to an eight-hour schedule. A rate of $3 a month for individual line business service is asked to supersede the present rate of $2. A rate of $2.50 is asked for individual residence service, an increase of 50 cents; and a rate of $2 is sought for two-party residence service, an increase of 50 cents.

Illinois Commerce Commission

February 28: Hearing at Chicago in the matter of the petition of the Western Illinois Telephone Co. for permission to enter into arrangements with respect to management, construction, engineering, purchasing and accounting service with its affiliates, the Central Electric & Telephone Co., a Delaware corporation, and the Iowa-Illinois Telephone Co., also a Delaware corporation. No. 27483.

Michigan Public Utilities Commission

March 9: Hearing at Lansing on application of the Michigan Associated Telephone Co. for authority to file increased rates for the Whitehall exchange. T-552.

January 25: Michigan Bell Telephone Co., authorized to enlarge base rate area of Royal Oak exchange. T-252-39.3.

January 30: Michigan Bell Telephone Co., authorized to re-classify the Saginaw exchange in relation to the application of schedule D "Miscellaneous Charges." T-252-39.2.

February 3: Michigan Associated Telephone Co. authorized and directed

to prepare and submit for approval and filing revisions to its tariffs to provide for individual two-party and four-party classifications within the Memphis base rate area in substitution for the present individual, two-party and six-party classifications; the rates for individual and two-party service to remain the same as heretofore and the rates for the four-party classification to be the same rates as heretofore applied to the six-party classification. T-552-39.1.

February 7: Traverse Bay Telephone Co. authorized to file Tariff MPUC No. 1, subject to usual qualifications. T-144-39.21.

February 14: Lake City Telephone Co. ordered to reduce rate for service station subscribers from 75 cents per month for switching service to 65 cents per month. T-305-39.1.

February 14: Union Telephone Co. given authority to modify Sidney exchange boundary line. T-223-39.1.

February 15: Michigan Bell Telephone Co. given authority to revise rates and charges applying to colored handsets. T-252-39.4.

February 15: Larkin Rural Telephone Co. granted authority to file articles extending corporate term. D-3220-39.1.

February 15: Whiteford Farmers' Telephone Co. granted authority to file articles extending corporate term. D-32219-39.1.

February 15: Chesaning Home Telephone Co. granted authority to file articles extending corporate term. D-3202-39.1.

February 15: Leighton Telephone Co. granted authority to file articles extending corporate term. D-3212-39.1.

February 15: Ironwood Rural Telephone Co. granted authority to file articles extending corporate term. D-3204-39.1.

February 15: Tri-County Telephone Co. authorized to increase exchange rates at its Rogers City exchange. T-550-39.2.

March 3: Hearing at Lansing on the application of the Massey Telephone Co. for a certificate of convenience and necessity. T-575.

March 9: Hearing at Lansing on application of the Tri-County Telephone Co. concerning Saugatuck rates and service. T-550.

Nebraska State Railway Commission

February 23: In the matter of the application of the Lincoln Telephone & Telegraph Co. for authority to close its exchange at Juniata and supply subscribers thereon with direct wires to Hastings exchange; there being no objections and the petition being supported by written consent of subscribers in excess of the legal requirements where exchange service is being discontinued, request granted as asked.

February 23: In the matter of the application of the Lincoln Telephone & Telegraph Co. for authority to close its exchange at Greenwood and to give subscribers a choice of direct wire service to either the Ashland or the Waverly exchange; there being no objections and the petition being supported by the legal number of subscribers now served, request granted as asked.

February 23: In the matter of objections of the Hamilton County Farmers Telephone Association to the paralleling of its grounded rural lines by transmission lines of the Hamilton County Public Power District on the ground that this would result in undue interference with service; application of public power district denied insofar as it relates to paralleled portion of lines until and unless agreement is made with protesting telephone company.

February 23: In the matter of the objections of the Humboldt-Speiser Telephone Co. to an application of the Eastern Nebraska Public Power District for authority to construct 234 miles of transmission lines in Richardson county; it appearing that a portion of power district construction would parallel certain portions of protestants' rural grounded lines, ordered that application be denied insofar as it relates to paralleled portion of telephone company lines until and unless an agreement is made with officials of the telephone company.

March 15: In the matter of the applications of the Lincoln Telephone & Telegraph Co. for authority to close its exchanges at Garrison and also at Belvidere; directed that hearing be held on this date at commission rooms in Lincoln.

New York Public Service Commission

February 21: Authorization granted the Chenango & Unadilla Telephone Corp., to issue $50,000 principal amount of its first and general mortgage 5 per cent bonds, to be exchanged or sold in whole or in part for refunding purposes. The bonds are to be issued under and pursuant to and to be secured by the company's first and general mortgage executed as of January 1, 1939, to the National Bank & Trust Co., of Norwich, N. Y., as trustee and are to be dated as of January 1, 1938.

North Carolina Utilities Commission

February 16: Application filed by the Cliffside Telephone Co. for permission to abandon the operation of its Avondale exchange, a magneto exchange with 45 stations.

February 20: The Seattle Telephone Co., owned by Mrs. Fannie P. Gillim, filed notice that the Altamahaw exchange will be discontinued at midnight, March 18. This is a magneto exchange serving between 50 and 60 subscribers in a rural area.

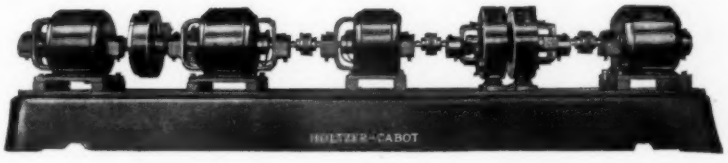
Wisconsin Public Service Commission

February 27: Hearing at Madison on application of the Commonwealth Telephone Co. for authority to purchase and Ferryville Telephone Co. to sell all of the properties of the latter company in the village of Ferryville and to make applicable to subscribers of the latter company the effective rates of Commonwealth Telephone Co.

February 28: Hearing at Wausau on application of the Rib Lake Telephone Co. for authority to purchase and Westboro Telephone Co. for authority to sell the property of the latter.

March 1: Hearing at Eau Claire on application of the Melville Settlement Telephone Co. for authority to increase rates.

March 2: Hearing at Mondovi on application of the Gilmanton Dover Farmers Telephone Co. for authority to increase rates.



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"Telephony's" Engineering Data

By B. C. Burden

Index, Subscriber Set Data, March 4, 1939 No. 4-A, Page 3

Anti-Sidetone Subscriber Set Circuit (Ctd.)

So the basic features of the anti-sidetone circuit may be compared with the standard common battery booster circuit, let us first examine the circuit of the standard subscriber's set. Fig. 1 illustrates the complete wiring diagram, as well as the simplified schematic of the transmission circuit only, of the standard common battery booster subscriber's set circuit.

The Standard Common Battery Circuit

Referring to the simplified schematic, Fig. 1(b), the action in this circuit is as follows: On outgoing transmission the variation in resistance of the transmitter, due to the impressed speech waves, sets up corresponding variation in the magnitude of the direct current flowing through the primary winding (wdg. 1-2) of the induction coil. This variation in the magnitude of the direct current from the central office battery results in an alternating current voltage being developed in the cord circuit repeating coil (or battery feed coils). This alternating current voltage in turn sets up a current flow in the receiver of the distant set.

In addition to the direct action just described there is a further effect which materially improves transmission and which accounts for the term *booster circuit* generally applied to this type of common battery set.

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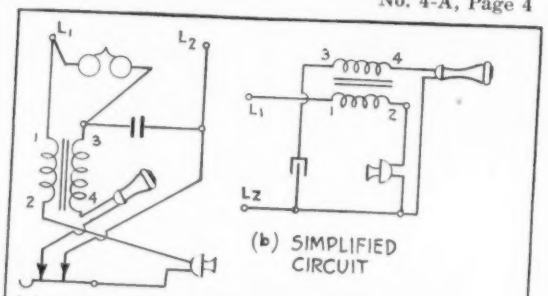

FIG. 2 - INEFFICIENT ANTI-SIDETONE CIRCUIT USED IN COMMON BATTERY TELEPHONE SETS ON LOW-RESISTANCE LOOPS.

The boosting effect results from the fact that the condenser charges and discharges through one of the induction coil windings (wdg. 3-4). The condenser and one winding, being connected directly across the transmitter, will charge when the voltage across the transmitter goes up (high resistance condition) and will discharge current through the winding when the voltage across the transmitter goes down (low resistance condition).

If the two windings are properly connected (polarity correct), the charging and discharging current will induce a voltage in the line winding in such direction as to assist or "boost" the voltage variations due to the transmitter alone. If the windings are incorrectly connected, a transmitting loss as high as 10 db may result. The transmitting improvement of the booster talking circuit as compared with a simple series circuit is about 3.5 db.

The induction coil used in typical common battery booster circuits has a turns ratio of about 1.20 to 1.60, depending on the make. Typical data for two makes of common battery booster induction coils are as follows:

Coils	Booster Winding	Line Winding
(A)	1400 turns No. 31 (27 ohms)	1700 turns No. 26 (14 ohms)
(B)	1025 turns No. 26 (9 ohms)	1600 turns No. 28 (14 ohms)

"Telephony's" Engineering Data

By B. C. Burden

Index, Subscriber Set Data, March 4, 1939 No. 4-A, Page 5

The slight step-up ratio between the booster and line windings is for the purpose of improving the impedance match and thereby the energy transfer between these two windings.

It is interesting to note that some telephone companies make use of what they term the "anti-sidetone connection" of the regular booster circuit. This is done where a booster instrument is used on a short loop (less than 90 ohms) and where sidetone might otherwise be quite objectionable. Due to the fact that this anti-sidetone connection interferes materially with transmission, it should not be resorted to except where necessary to minimize the effects of severe room noise.

Fig. 2 illustrates this type of anti-sidetone connection as compared to the normal connection. A study of this circuit shows that the booster action is lost; hence the sidetone is greatly reduced. The transmitting efficiency is from 3 to 4 db less than the booster type; therefore, this connection should not be resorted to except on short loops where excessive room noise interferes with receiving.

As previously stated, anti-sidetone circuits have been used for a number of years in the operator's circuit, Fig. 3. Although common battery anti-sidetone subscribers' sets have also been available for more than 10 years, yet the substantial transmission benefits of a "true anti-sidetone set" have not been generally appreciated by operating telephone men.

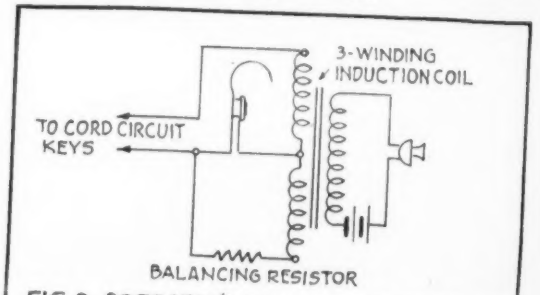

FIG. 3. OPERATOR'S ANTI-SIDETONE CIRCUIT.

IN THE NATION'S CAPITAL

(Continued from page 14)

member this two-partition proposal of Senator White's and incorporate it in the new law.

Readers of this department (TELEPHONY of February 4) may recall that your correspondent suggested the possibility that when Congress does reorganize the FCC, it may do something to separate the regulation of the telephone and telegraph industries from the regulation of radio broadcasting. It was not then suggested that Congress would ever set up two different commissions, but that "there is much to be said for a statutory segregation of the FCC into two branches—commercial communications and broadcasting."

Now, that is just what Senator White proposes to do. Out of his eleven commissioners he would establish two divisions of five members each. One of these divisions would regulate radio broadcasting and the other would regulate commercial point-to-point communications, including the telephone and telegraph industries.

The first would be known as the "division of public communications"; the second would be the "division of private communications." Over and above the work of these commissions there would be the chairman whose job would be to coordinate the work of both agencies and function as the principal executive officer.

The chairman, however, would not take part in the regulatory work of either division, except in case of a vacancy. In those situations which would require the action of the commission as a whole, the chairman would serve as the presiding officer and have a vote—otherwise he would in effect remain voteless. As a practical matter, this would be most of the time, since the full commission would act only for the adoption of general rules and regulations and in determining matters of policy. The judicial and quasi-judicial functions of the commission, which means the bulk of the actual regulatory work, would be lodged in the two divisions.

Other features of the White bill are not of much particular interest to the telephone industry, since his bill would not change the substantive divisions of the Communications Act with respect to telephone business. It would, however, extend the present authority of the FCC to authorize merger of telephone companies to other communications carriers. The bill also contains Senator White's ideas about political broadcasting.

P.S.: There was nothing new stirring this week on the Herring-Harrington bills, or allied bills, for exemption of small telephone exchanges from wage-hour standards. Because the committees of both houses of

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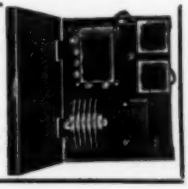

FIG. 3. OPERATOR'S ANTI-SIDETONE CIRCUIT.
Coils (A) 1400 turns No. 31 (27 ohms) (B) 1025 turns No. 26 (9 ohms)
Booster Winding 1700 turns No. 26 (14 ohms)
Line Winding 1600 turns No. 28 (14 ohms)
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FOR SALE: Western Electric 505-C Cordless P.B.X.. 7 local lines, 3 trunks. Perfect condition, $60.00. Automatic Electric Cordless P.B.X., same line equipment as above. Working condition, $25.00. Address, Kenneth Rettaliata, 1407 N. Charles St., Baltimore, Md.

TELEPHONY ADVERTISERS
will give you service which will be pleasing

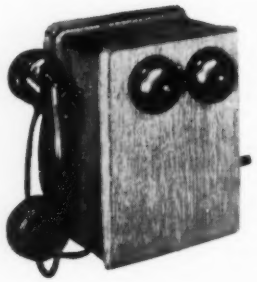
HELP WANTED

DESIGN ENGINEER: First class designer with theoretical background and experience in research and design of electromechanical equipment as selectors, switches, relays, etc., as used in automatic telephone systems, is offered an interesting position abroad with outstanding manufacturing firm. (Not Germany.) Age—early thirties. Our own men are informed. Address 8778, care of TELEPHONY, giving full details.

POSITIONS WANTED

POSITION WANTED — Registered electrical engineer, State of Ohio; university graduate; five years' telephone experience outside plant construction, maintenance—central office and outside plant, also plant engineering. Five years appraisal engineer, power and light company. Seeks position as telephone company manager or construction superintendent. Address 8709, care of TELEPHONY.

MAGNETO HAND SETS



NEW CABINET with reconditioned Kellogg, Stromberg-Carlson, Western Electric Co. or Leich equipment as ordered.

with

NEW LEICH HAND SET
3 bar 4 bar 5 bar

Write for circulars

BUCKEYE TELEPHONE and SUPPLY COMPANY
COLUMBUS, OHIO

Congress wanted to obtain the views of the Wage-Hour Administrator, it is now unlikely that the hearings will get started as soon as had been expected. But there won't be much delay, for the simple reason that the Congressional sponsors are very actively behind these bills.

A slight delay was to be reasonably expected because of the fact that the Wage-Hour Administrator decided to sound out the state regulatory commissions on the possible effect of wage-hour compliance on the rates and service of the smaller telephone exchanges.

It is understood that so far, replies from the state commissions have been very much in favor of reasonable exemptions. At least one state commission went so far as to advocate total exemption of the entire telephone industry because of the particular nature of employment of telephone operators. This reply came from a state where Independent telephone operators are almost negligible in comparison with Bell.

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Telephone and Fire Truck Save Farm Property

The combination of telephone and a community-owned fire truck was responsible for an estimated $6,000 saving of property when fire occurred on a farm. A country fire truck was purchased recently by the rural community of New Richland, Minn.

Shortly after one of the rural subscribers of the local exchange of the Central Electric & Telephone Co. had a fire. He used his telephone to summon the fire truck and the telephone operator sent out a general alarm over neighboring farm lines. The prompt response of the fire truck and neighbors — all summoned by telephone saved the property with minimum loss, according to local manager Theo. De Boer of the New Richland exchange.

▼ ▼

Some Telephone Things I Didn't Know Until Now

By OSCAR WILL TELL

That the telephone central office in Tower, Minn., is located in the railroad station.

That in Shanghai, China, at times sand storms in the Gobi Desert, 800 miles away are felt. The atmosphere is charged with particles of fine sand, which seeps into buildings. This would be a menace to the maintenance of telephone equipment if no provisions were made for the protection of the plant.